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# CAMERA SHOPPER

THE BIGGEST AND BEST PHOTOGRAPHY BUYERS' GUIDE



Spring is the perfect time to start taking your photography more seriously. Gardens, trees, fields and hedgerows are starting to come to life, adding a splash of colour to the world. The outdoors are so much more enticing once the days start to get a little brighter, longer and warmer. It's only natural that many of us start thinking about buying a new camera, lens or accessory at this time of year.

In this issue of *Camera Shopper*, we've got reviews of all the latest SLRs and compact system cameras, but we've also included group tests of some excellent stand-ins: compact cameras with large sensors and bridge cameras with huge zoom ranges. After all, you can't always take a big, heavy SLR with you.

If you are on the look-out for a brand-new interchangeable-lens camera, however, there's plenty to choose from. Mirrorless compact system cameras tend to be a bit smaller and lighter than SLRs, making them more attractive to carry around, but SLRs still have the edge for autofocus speeds when you're composing images in the viewfinder. Our reviews will help you decide which is right for you. Every camera reviewed in *Camera Shopper* is tested extensively by dedicated photographers in real-world shooting situations, as well as in our lab.

*Angela*

Angela Nicholson Head of Testing



## Brought to you by Digital Camera



*Camera Shopper* is brought to you by the team behind *Digital Camera*, the UK's best-selling monthly photographic magazine. Our reviews are produced by our dedicated testing team, which is made up of experts in the field.

# CAMERA SHOPPER

THE BIGGEST AND BEST PHOTOGRAPHY BUYERS' GUIDE

## Your team

Head of Testing & Editor **Angela Nicholson**  
angela.nicholson@futurenet.com

Art editor **Shona Cutt**  
shona.cutt@futurenet.com

Group editor-in-chief **Chris George**  
chris.george@futurenet.com

Group art director **Rodney Dive**  
rodney.dive@futurenet.com

## Editorial contributors

Ben Andrews, Amy Davies, Ali Jennings, Angela Nicholson, Matthew Richards

## Photographic contributors (where not credited inside)

Future Photo Studio

## Advertising

For advertising queries, contact **Matt Bailey** matt.bailey@futurenet.com

## Production & distribution

Production co-ordinator **Vivienne Calvert** vivienne.calvert@futurenet.com

Production manager **Mark Constance** mark.constance@futurenet.com

Printed in the UK by William Gibbons and Midway Colour Print on behalf of Future.  
Distributed in the UK by Seymour Distribution Ltd,  
2 East Poultry Avenue, London EC1A 9PT. Tel: 020 7429 4000

## Circulation

Trade marketing manager **Michelle Brock** michelle.brock@futurenet.com

## Licensing

International director **Regina Erak** regina.erak@futurenet.com

## Management

Content & Marketing director **Nial Fergusson**

Head of Content & Marketing: Photography, Creative & Design **Matthew Pierce**

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**Chief executive** Zillah Byng-Maddick  
**Non-executive chairman** Peter Allen  
**Chief financial officer** Richard Haley  
Tel +44 (0)20 7042 4000 (London)  
Tel +44 (0)1225 442244 (Bath)

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The  
UK's most  
in-depth  
reviews

Imaging lab manager Ali Jennings benchmarks cameras and lenses in our controlled testing environment

# Trusted Tests

Rigorous > Accurate > Independent > Fair

**C**amera Shopper is brought to you by the UK's most experienced team of photography journalists, which means you can trust everything you read on these pages and can buy your next piece of photography equipment with total confidence. In case you need any further convincing, here's why our tests are the best:

## Depth

At *Camera Shopper*, we take great pride in the rigorous nature of our testing process. Every product and service is tested in appropriate circumstances, and a combination of real world and objective tests are performed to ensure all products and services are credibly

graded. Take a look at the opposite page for more details.

## Passion

We believe the best way to test a product is to use it as it was intended, so our real world testing involves taking equipment on a proper shoot – whether outdoors or in the studio – and testing it exactly as you would use it in real life to let you know whether it's fit for purpose.

## Objectivity

Although scientific data won't tell you everything about a product, it's a great way to draw direct comparisons and sense-check our real world conclusions, so we've devised a series of controlled tests for cameras and

lenses that supplement our real world testing with benchmarks.

## Independence

*Camera Shopper* is 100% independent and never swayed by the influence of advertisers or PR firms. The tests you read in the magazine are our genuine unbiased opinions and Future Publishing, the company behind *Camera Shopper*, has a strict code of conduct on testing.

## Transparency

The JPEG files of every test image we shoot can be downloaded from our website, TechRadar ([www.techradar.com/cameras](http://www.techradar.com/cameras)). This means you can check the quality for yourself and even run your own tests if you wish.

## OUR SCORES AND AWARDS EXPLAINED

**T**wo philosophies underpin our scoring system: transparency and flexibility. Transparency involves keeping our scoring accurate and explaining why we reach a verdict. Flexibility enables us to change our scoring criteria to ensure that each product and service is scored on appropriate criteria – a tripod, for instance, needs to be judged on different qualities than a digital SLR, and a flashgun needs to be judged on different

## HOW WE TEST

*Camera Shopper's* test policy is the most strict and rigorous of any photography magazine. We believe the only way to bring you a genuine and reliable verdict on a product is to test it in both the field and the lab, so we use two sets of criteria to test SLRs and lenses – real-world testing and objective testing.

## Real-world testing

The first and most important pillar of our process is real-world testing. We firmly believe that the best measure of a product is how it performs in the field (or studio) doing the job for which it was intended. The majority of our testing time is therefore spent using products in this way, so we can report back on how they cope under a number of different lighting scenarios and conditions.

The first part of our real-world testing involves telling you how a product handles and our impressions of its performance; the second is about examining the image quality produced, so we take a number of photographs under different conditions with every camera and lens we test, which means you can see the results achieved for yourself.

## Benchmarking

The second pillar of our testing policy involves testing the output



qualities than a lens. Each of our tests scores out of five in one or more sub-categories and then applies an overall mark out of five, enabling you to tell the wheat from the chaff.

### Five scores, five meanings:

★ ★ ★ ★ ★

Forget it

★ ★ ★ ★ ★

Below average

★ ★ ★ ★ ★

Good for the money

★ ★ ★ ★ ★

Very good in all areas

★ ★ ★ ★ ★

A truly exceptional, best-in-class product



Awarded to any product that comes top in a group test



Awarded to products that offer exceptional value for money



Awarded to any product that receives five stars in a test



Particularly innovative or breakthrough products receive this special award



A discretionary award given to truly exceptional products

of cameras and lenses under controlled conditions. We shoot a series of test charts that are specifically designed to test different performance aspects of a camera or lens. Further details about the tests we perform can be found in the panel to the right.

To minimise the variables when testing SLRs, we use Sigma's 50mm f/1.4 EX DG HSM prime lens, which is available for every SLR camera system.

Next, we perform an analysis of the test images using Imatest's Imatest Master ([www.imatest.com](http://www.imatest.com)) and DxO Analyzer ([www.dxo.com/intl/image\\_quality/dxo\\_analyzer](http://www.dxo.com/intl/image_quality/dxo_analyzer)) to generate benchmark figures for each test. These can then be plotted against the results from rival products to enable us to

make a direct comparison and determine which performs better under different criteria.

Copies of the resolution test chart images are available to download from our website – go to [www.techradar.com/cameras](http://www.techradar.com/cameras), choose the camera you're interested in and browse the review for full details of all tests. Benchmarks shouldn't be seen as a substitute for real-world testing, though – they won't tell you which camera handles best in the field or is easiest to use, but they do enable us to sense-check our real-world image test results and make accurate comparisons of products' capabilities.

No other magazine goes this far to deliver equipment test results you can really trust.

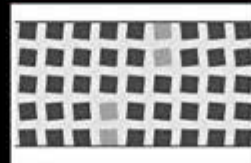


Our head of testing, Angela Nicholson, puts equipment through its paces

## THE APPLIANCE OF SCIENCE

Camera Shopper runs tests under controlled conditions on both camera bodies and lenses. Lenses are assessed using an Imatest analysis of photos of three charts. We use both Imatest Master and DxO Analyzer to measure camera performance in four tests. Here's more about each test...

### Lens tests



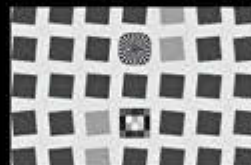
#### DISTORTION: IMATEST

**1** This test measures the distortion caused by the lens. We shoot the simple, lined chart pictured above and then output an accuracy percentage in Imatest. The most accurate result (ie, the best) would be 0%.



#### FRINGING: IMATEST

**2** This test measures the occurrence of chromatic aberration. We shoot the chart pictured above, then analyse the photos using Imatest. The results are expressed in pixels, with lower numbers being better.



#### SHARPNESS: IMATEST

**3** Here we measure sharpness at different apertures from the centre to the outer edge. We shoot the chart pictured and Imatest outputs a figure based on line width divided by picture height – high numbers are better.

### Camera tests



#### DYNAMIC RANGE: DXO ANALYZER

**1** This is a measure of a camera's ability to capture detail in the highlights and shadows. We use DxO's transmissive chart, which enables us to test a dynamic range of 13.3 stops.



#### COLOUR ERROR: IMATEST

**2** This measures colour reproduction. We shoot the X-Rite ColorChecker chart pictured above and output an accuracy percentage from Imatest, with 100% being the most accurate result possible.



#### NOISE: DXO ANALYZER

**3** We use the dynamic range transmissive chart to analyse the signal-to-noise ratio for raw and JPEG files at every sensitivity setting using DxO Analyzer. A higher value means the signal is cleaner.



#### RESOLUTION

**4** We use a resolution chart based on ISO-12233 from Applied Image Inc to indicate the limit of the camera's vertical resolution at the centre of the frame. The higher the value, the better the detail resolution.

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# Cameras

Modern SLRs and CSCs have plenty to offer novice and enthusiast photographers – not least their superb image quality

Cameras with removable lenses can broadly be divided into two types: SLRs, and mirrorless or compact system cameras (CSCs). Single-lens-reflex (SLR) cameras have a mirror that bounces light into an optical viewfinder, so you can see the image through the lens. Compact system cameras don't have a mirror, so they are a bit smaller. They display a live view from the sensor on their screen or, in some cases, in an electronic viewfinder (EVF). Helpfully, CSC viewfinders and screens can show the impact of camera setting changes.

Compact cameras have fixed lenses, but the models in our group test have sensors that are the same size as those in many SLRs and CSCs. This means their image quality is very high, making them an attractive alternative to a larger camera. Thanks to their huge zoom range, the bridge cameras in our group test are also enticing when you don't want to carry a bagful of lenses.

The following pages will help you find the perfect camera for you..

## GROUP TESTS

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# Large-sensor compacts

With superb image quality and plenty of manual controls, these compacts deliver the goods



## 1 Canon PowerShot G1X Mark II

**Price:** £649 / \$799

**Web:** [www.canon.com](http://www.canon.com)

For years Canon's G-series was considered the king of the premium compact. The G1X Mark II addressed some problems with its predecessor to produce a capable offering.

You'll find a sensor almost as big as APS-C and a flexible 5x optical zoom, offering f/2 at the wide angle and rising to f/3.9 at the telephoto end. It's not quite as bright as the Panasonic's zoom lens, though.

The use of a Digic 6 processor results in excellent noise control, and images are characterised by that pleasing Canon warmth the company is known for. It also features a responsive touchscreen and built-in Wi-Fi.

### Digital Camera

**What's good:** Super-quick processing and focusing; low-noise images are possible thanks to the Digic 6 processor.

**What's bad:** The heaviest camera on test.

**We say:** Fantastic image quality in a body that has lots of fantastic features.

**VERDICT** ★★★★★

## 2 Fujifilm X100S

**Price:** £799 / \$1,099

**Web:** [www.fujifilm.com](http://www.fujifilm.com)

Along with its APS-C X Trans CMOS sensor, the X100S features a fixed-length 23mm f/2 lens and a range of traditional controls that enthusiasts will appreciate. They help to give the Fujifilm a gorgeous retro look.

It's also fitted with an excellent hybrid viewfinder, which gives you the choice between optical and electronic. Generally speaking, we prefer the electronic version.

A quick and accurate focusing system and excellent image quality make this a great choice for many. There's no built-in Wi-Fi, though, and while the rear screen is good, it isn't touch-sensitive.

### Digital Camera

**What's good:** Controls are sensibly arranged, so using it is easy and quick.

**What's bad:** Fujifilm's other X cameras have built-in Wi-Fi, but not this one.

**We say:** A gorgeous, retro-inspired camera with fantastic controls and manual modes.

**VERDICT** ★★★★★

## 3 Nikon Coolpix A

**Price:** £480 / \$699

**Web:** [www.nikon.com](http://www.nikon.com)

Nikon fans looking for a pocketable alternative to their digital SLR should find favour with the Coolpix A, which has an APS-C-sized sensor and a fixed 28mm f/2.8 lens.

There's also no anti-aliasing filter, for increased detail resolution. Images produced by the camera are great and almost match that of an equivalent SLR and lens attached – albeit with evidence of corner shading in some cases.

Unfortunately, there's no touch-sensitive screen or built-in Wi-Fi, and sadly focusing can be a little slow at times. If you're already a Nikon user, though, you'll be right at home with the menu system.

### Digital Camera

**What's good:** Controls are sensibly arranged, so using it is easy and quick.

**What's bad:** Corner shading is evident in some images; no Wi-Fi or touchscreen.

**We say:** An enjoyable camera to use that can produce excellent images.

**VERDICT** ★★★★★





#### 4 Panasonic Lumix LX100

Price: £699 / \$899

Web: [www.panasonic.com](http://www.panasonic.com)

The newest camera on test, the LX100 combines everything that is great about the Micro Four Thirds range with a versatile 24-75mm zoom lens. Plenty of control options, including a traditional aperture ring and shutter speed dial, can give way to fully automatic when you want to concentrate on composition.

An excellent built-in viewfinder makes this feel closer to SLR shooting than some of the other compacts in the group, and the view inside is clear and bright. There's also built-in Wi-Fi for remote shooting and quick sharing of your images. The only major downside is that the screen isn't touch-sensitive.

#### Digital Camera

**What's good:** A superb viewfinder includes a sensor for detecting when the camera is lifted to the eye.

**What's bad:** There's no room for an built-in flash - but one is supplied in the box

**We say:** A dream for enthusiasts.

**VERDICT** ★★★★★

#### 5 Ricoh GR

Price: £479 / \$696

Web: [www.ricoh.com](http://www.ricoh.com)

The pocket-friendly Ricoh GR is also the most wallet friendly here, having been around for some time now. Inside you'll find an APS-C-sized sensor and, like the Nikon Coolpix A, a fixed-length 28mm f/2.8 lens.

It's also missing an anti-aliasing filter, for excellent detail reproduction, while colours are natural and exposures are good. Noise is well-controlled, but it's advisable to shoot in raw format to get the most from the camera.

Looking at the negatives, there's no built-in Wi-Fi, the screen isn't touch-sensitive, and you could argue that cameras with a zoom lens offer more flexibility.

#### Digital Camera

**What's good:** All the manual control you need in a light and small body.

**What's bad:** The display can be a little hard to see in very bright light.

**We say:** Great custom options plus sharp images make this a good all-rounder.

**VERDICT** ★★★★★

#### 6 Sony RX1R

Price: £2,299 / \$2,798

Web: [www.sony.com](http://www.sony.com)

The most expensive camera in the group, the RX1R is also the only one with a full-frame sensor. Traditional controls will be appreciated by enthusiasts, while the fixed-length 35mm f/2 Carl Zeiss lens is ideal for street photography, but also works well as an all-purpose optic.

Colours are vibrant, while noise is controlled well in low light. The lack of an anti-aliasing filter means that detail is resolved exceptionally well.

On the downside, there's no built-in Wi-Fi connectivity or touchscreen functionality, and battery life is somewhat lacking. It's also the most cumbersome of the group - you'll have trouble fitting it into a jacket pocket.

#### Digital Camera

**What's good:** A full-frame sensor joins with a Carl Zeiss lens for superb image quality.

**What's bad:** Battery life is very poor, sometimes lasting just a couple of hours.

**We say:** Not a camera for the masses, but enthusiasts won't be disappointed.

**VERDICT** ★★★★★



# Bridge cameras

A bridge camera makes a fantastic alternative to your main camera when you don't want to take your SLR



1

## Canon PowerShot SX60

**Price:** £400 / \$549

**Web:** [www.canon.com](http://www.canon.com)

With its 65x optical zoom (21-1,365mm equivalent), the SX60 is the market leader for zoom range (although Nikon has announced an 83x range for the upcoming P600). It's also got full manual control, the ability to shoot raw files, and a viewfinder. Sadly, there's no eye-sensor on the viewfinder. Image quality is good, but it does suffer in low-light conditions. If you examine images at 100%, you'll see some speckling and noise.

**We say:** A great camera, just held back from perfection by a few niggles.



2

## Fujifilm Finepix HS50 EXR

**Price:** £276 / \$289

**Web:** [www.fujifilm.com](http://www.fujifilm.com)

With the shortest zoom range here, just 42x optical, the HS50 is perhaps the most SLR-like of these cameras. A maximum aperture of f/2.8 is also available at the wide end of the lens, and the HS50 shoots in raw format, has an articulating screen and has a sensor for the excellent viewfinder. Image quality is pretty good too, but there is some image smoothing apparent when examining images at 100%.

**We say:** The most SLR-like of the bunch, but offering the shortest zoom.



3

## Nikon Coolpix P600

**Price:** £300 / \$345

**Web:** [www.nikon.com](http://www.nikon.com)

The big selling point of the P600 is its long 60x zoom range. It's also shaped like a mini-SLR and its textured grip sits nicely in the hand. It's not all smooth sailing, though: there's no eye-sensor for the viewfinder, and you can't shoot in raw format – both features seen in other cameras on test. On the plus side, you'll get images which are nice and bright directly from the camera, and there's built-in Wi-Fi and an articulating screen.

**We say:** A reasonably solid offering, particularly appealing if you're a Nikon fan.



4

## Olympus Stylus SP-100EE

**Price:** £215 / \$369

**Web:** [www.olympus.com](http://www.olympus.com)

The world's only camera to feature a dot-sight to help you frame and track subjects in the distance, the SP-100E sadly doesn't feature too many other enticing features, other than a 50x zoom length. There's also no raw-format shooting, no articulation in the screen, and no sensor on the viewfinder. In good light, images are bright and punchy from the camera – though if you examine closely, you will spot some image smoothing.

**We say:** If you like wildlife photography, the dot-sight is particularly useful.



5

## Panasonic Lumix FZ72

**Price:** £215 / \$248

**Web:** [www.panasonic.com](http://www.panasonic.com)

With a huge 60x zoom range, the FZ72 features an impressively wide angle of 20mm. Its aperture opens up as wide as f/2.8, which is really useful for low light and for creating shallow depth of field effects.

But the screen is fixed and not touch-sensitive, while the electronic viewfinder lacks an eye-sensor. Image quality is good, and you can shoot in raw format should you require that extra flexibility.

**We say:** The FZ72 is quite old, and there are better all-round contenders available.



6

## Sony HX400V

**Price:** £319 / \$398

**Web:** [www.sony.com](http://www.sony.com)

With a textured grip and an eye-sensor on the viewfinder, using the HX400V is pleasant. A 50x optical zoom gives you plenty of scope.

The screen is tilting, but not articulating, which makes it useful for some angles but not others. You can't shoot in raw format, a shame for a camera aimed at an enthusiast audience, but the JPEG images exhibit great colours and detail. You'll see some smoothing if you examine images at 100%.

**We say:** A solid camera, which could be improved with a couple of extra features.









## &gt; THE SPECS

Sensor	18MP APS-C (22.3x14.9mm) CMOS sensor
Focal length conversion	1.6x
Memory	SD/SDHC/SDXC
Viewfinder	Optical viewfinder, 95% coverage, 0.8x magnification
Video resolution	Full HD (1,920x1,080 pixels) at 30, 25 or 24fps
ISO range	ISO 200-6,400 (expandable to 12,800)
Autofocus points	9
Max burst rate	3fps
LCD screen size	3-inch; 460,000 dots
Shutter speeds	1/4,000-30 sec
Weight	480g (inc battery and memory card)
Dimensions	129.6x99.7x77.9mm
Power supply	BLS-5 Li-Ion battery



SLR Canon 1200D &gt; £429 with 18-55mm

lens > [www.canon.co.uk](http://www.canon.co.uk)

**T**he new Canon EOS 1200D replaces the 12-million-pixel EOS 1100D, which is now three years old, and sits

just below the ultra-small 100D as the first camera in Canon's line-up. The 1200D is less a major overhaul of its predecessor than a gentle upgrade. In terms of specifications, it seems like Canon has played it relatively safe. It features an 18-million-pixel sensor, and has a Digic 4 processor, which is two generations old.

## FEATURES

Aimed squarely at the entry-level user, the 1200D comes packed with several automatic modes, including Scene Recognition Auto and some creative modes to give images a different look. Unlike the 100D, these filters can only be applied post-shooting, rather than as the image is being captured.

On the back of the camera is a 460,000-dot, three-inch display, which is neither touch-sensitive nor tilting. It is joined by an optical viewfinder that offers a 95% field of view.

Full HD video recording is possible, which means that the whole Canon digital SLR line-up now has the capacity to record high-resolution movies. You can also take full manual control of video recording, which is nice to see in an entry-level model.

The camera's native sensitivity run starts at ISO 100, rising up to ISO 6,400, but this is expandable up to 12,800. As the camera doesn't use the most recent image processor, it will be interesting to see how well it copes

with noise in high-sensitivity and low-light situations.

There are nine autofocus points, with only the central point being cross-type for extra sensitivity. The camera can shoot at up to three frames per second, which doesn't compare particularly well with the Nikon D3300's 5fps, for example.

Canon hasn't included Wi-Fi or NFC connectivity for the 1200D. Although that's perhaps offputting for those coming from a smartphone background, it's to be expected at this price point. It is compatible with Wi-Fi-equipped SD cards, though, if you want to expand its capability.

Battery life is claimed to be up to 500 shots, which is a reasonable offering. Again, though, it doesn't compete too well with the Nikon D3300, which is rated at over 700 shots per charge. But although the 1200D goes head to head with the D3300, with them both sitting in the same position in each other's

**Above** With a decent kit lens included, the 1200D looks great value

respective line-ups, the 1200D, for now at least, is much cheaper.

## BUILD AND HANDLING

Canon has given the 1200D an improved look and feel compared with the 1100D. It's now more in line with something like the 700D, which sits ahead of it in the line-up.

As there is no touchscreen on the 1200D, every element of camera control is done via the physical buttons, unlike some of the other SLRs in Canon's range (such as the 100D and the 700D). Despite it being an entry-level model, there are still a decent number of those buttons on the back of the camera, including dedicated buttons for white balance and sensitivity (ISO).

As can be found on all Canon digital SLRs, there is a mode dial on top of the camera to enable quick changes between the different shooting modes on offer. There's a lot of choice on this dial, including the

# Bag a bargain

Canon's EOS 1200D is certainly excellent value for money – but what are the images like? **Amy Davies** finds out





The 1200D's textured coating and chunky grip help you get a firm hold



There's a good range of direct control buttons on the 1200D



Successful composition through the viewfinder can be tricky



The rear screen is neither touch-sensitive nor articulating

◀ FEELING TREATED

## Zooming in on the... Canon EOS 1200D

A quick tour of the camera's key features



Tap this Q button to quickly access up to 12 settings you'll commonly use, such as metering



Use this button to start shooting with Live View – but note that focussing speeds will be drastically reduced

The left-hand button here allows you to change the active AF point, of which nine are available



Canon hasn't made any drastic changes to the user interface: it's simple and does the job



standard exposure modes, as well as fully automatic and the various scene modes the camera offers.

Unlike with the 100D, in order to activate video recording, you need to set the mode dial to this setting. The Live View button on the back of the camera can then be used to start the recording off.

By pressing the quick menu button, labelled as Q, you can quickly scroll to 12 different settings displayed on the screen and change them using the scrolling dial. So, for instance, you can navigate to the metering setting, then scroll with the

**“The 1200D is less a major overhaul of its predecessor than a gentle upgrade”**

dial to change from general-purpose to spot metering.

There aren't many in the way of creative options to be found on the 1200D – there's no panoramic mode of the kind you'll find on the D3300 – but you can experiment with Picture Styles before shooting. There are a number of presets, such as Landscape and Monochrome, which

you can modify, for instance by upping the contrast. The benefit here is that you can shoot in raw format to keep an unaltered version of the image should you need it.

Along with that option, you can also edit photos in-camera with certain filter effects. These are fun to experiment with – and you'll have the original version of the file too.

There will be those who prefer optical viewfinders to electronic. Although the 1200D's optical finder is bright and clear, the fact that it only offers a 95-per-cent field of view can be problematic as stray artefacts can creep into compositions.

## Meet the rivals...

See how the EOS 1200D stands up against the competition



**Nikon D3300**

£499 (body only)

With its high resolution, the D3300 satisfies those who crave megapixels without skimping on image quality.

Reviewed: page 46



**Canon EOS 100D**

£399 (body only)

The smallest and lightest SLR on the market and a fantastic choice for the first-time SLR buyer.

Reviewed: page 18



**Fujifilm X-A1**

£369 with 18-50mm lens

The X-A1 CSC scores well for build, functionality and price, which makes the slight dip in image quality from the X-M1 palatable.

Not reviewed

## PERFORMANCE

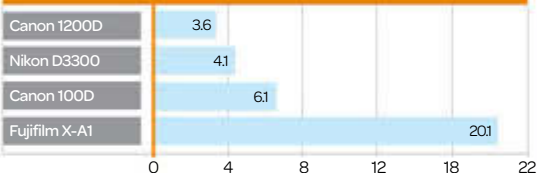
Image quality from the 1200D is very good, as we've come to expect from Canon cameras. Colours are bright and punchy without being overly vibrant. The 1200D maintains Canon's propensity towards pleasingly warm tones that stay just on the right side of accurate.

You can use Picture Styles to experiment with how colours appear, which is useful if you want to increase vibrancy or contrast. Using the

## CAMERA BENCHMARKS

How does the EOS 1200D measure up?

## COLOUR ERROR Closest to zero is best



**COLOUR ERROR RESULT:** This test shows the 1200D is reasonably close to accurate, erring on the side of producing warm tones.

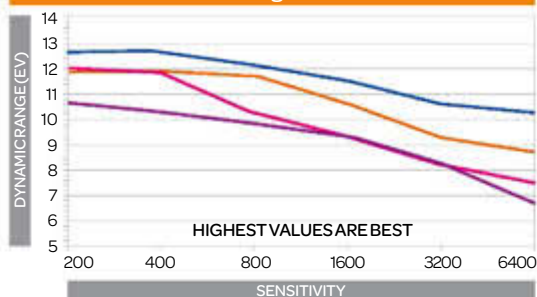
**KEY** Canon 1200D (purple), Nikon D3300 (pink), Canon 100D (orange), Fujifilm X-A1 (blue)

## RAW NOISE\* Highest values are best



**NOISE RESULT:** The graph suggests the 1200D is a poor performer, but this could be due to Canon prioritising detail resolution.

## RAW DYNAMIC RANGE\* Highest values are best



**DYNAMIC RESULT:** The 1200D puts in a consistent performance across the sensitivity range, although the X-A1 does better.

## OVERALL BENCHMARK RESULT

JPEG images have a stronger signal-to-noise ratio result than the raw format images, reflecting the fact Canon is applying its own noise-processing to JPEG images in-camera. For dynamic range in JPEG images, the 1200D beats its predecessor by a good margin, but is closely matched with the Nikon D3300.

\*Raw results use images converted to TIFF

- ① Automatic setting is good for everyday shooting scenarios, while the Monochrome setting gives pleasing black-and-white images.

Compared to the Nikon D3300's 24.2 million pixels, 18MP may seem fairly modest, but the 1200D is capable of resolving a good amount of detail. Our lab tests indicate that the 1200D does well for detail resolution, favouring it over noise reduction, especially in raw files.

**Above right**  
Experiment with Picture Styles in-camera to shoot in monochrome



If you examine images at their actual size, it's possible to see some image smoothing at mid-range sensitivities, but it's not something that is troubling at printing sizes of A3 or below. At low sensitivities, such as ISO 100 or 200, detail is kept well.

The Nikon D3300 has a higher resolution and no optical low-pass filter, so it is better placed to capture detail. But the difference is probably only something you'll notice if you make huge prints or tend to shoot photographs with lots of fine detail in them.

Noise is generally well controlled throughout the sensitivity range. At reasonably high sensitivities, such as ISO 800, noise is very low, which is great to see. Happily, detail is also kept pretty well at these sensitivities. There is more noise visible at ISO 1,600, although the noise reduction system does a good job of keeping it to a minimum. There is some detail lost if you examine an image at actual

size, but it's not likely to be a problem for the typical user.

More detail is visible in raw files with the noise reduction switched off. This means you can apply your own processing using Canon's Digital Photo Professional software, which comes with the camera, depending on whether you want to prioritise detail resolution or lack of noise.

Like other Canon cameras, the 1200D uses Canon's iFCL metering system. Generally, this does a good job of producing well-balanced exposures, but it can be problematic to use when you're shooting a high-contrast scene.

The camera's automatic white balance system does an excellent job in most situations. While shooting under artificial lighting, the camera errs ever so slightly towards warmer tones, but it's generally not too displeasing. You can always set a more specific white balance setting.

Processing speed can sometimes be a little lacklustre. For instance,





## Tech Briefing

## Canon EOS Companion app



While Nikon includes an in-camera guide to taking photographs in the D3300, Canon has created an app that can guide you through the basics of using your camera, along with giving you hints, tips and inspiration for photography itself.

EOS Companion is available for Android and iOS. It includes a fun game, which asks you to select a random theme ('Clothes', for example) and an approach (like 'Happy'), which can be a good way to challenge yourself. Exercises are also available to show you more conventional techniques, such as making the subject stand out. Lens tutorials are useful when you want to move past the kit lens.

if you take a couple of shots in quick succession, waiting for them to appear on the back display can take a frustrating few seconds. This is probably due to the older processor. In fairness, it's also something that is problematic with the Nikon D3300.

Autofocussing speeds are generally fairly good when shooting in bright light. The kit lens takes a little longer to focus than some other prime lenses, and because it's not

**Above** Colours are bright and punchy straight from the camera, displaying a pleasing warm tone

**Below** The top controls follow the classic Canon layout

hyper- or ultrasonic, it can seem quite loud if you're shooting in a quiet environment. It's also worth noting that switching to Live View significantly reduces the speed at which the camera can focus, so it's only really recommended for shooting still or nearly still subjects. It can be useful for shooting macro subjects, where the larger view is useful for pinpoint-accurate focussing.

Going back to the kit lens for a moment, the 18-55mm f/3.5-5.6 optic supplied with the 1200D is a decent all-round performer for your first lens. By shooting at mid-range apertures, such as f/8, we can assess the sharpness of the lens. Here the kit lens puts in a good performance, producing reasonably sharp images across the frame.

Although battery life isn't quite as good as the quoted Nikon D3300 battery life, it still puts in a very good performance. We shot for a few hours at a time, and the battery indicator was still displaying as full or nearly full by the end of the day. It's unlikely you'll need a second battery unless you plan to shoot with it for several days at a time without charge.

## VERDICT

Three years is a long time to wait for an upgrade of this kind of camera, so

we can't help but be a little disappointed not to see something a little more revolutionary in the 1200D's specifications. That said, image quality is great, if not a massive leap forward from the 1100D.

Detail resolution is good, but not quite as good as the Nikon D3300, which has a higher-resolution sensor and no anti-aliasing filter. Unless you're planning to make huge prints, though, it's not something that should be too much of an issue for the majority of subjects.

There's no touchscreen on the 1200D, but thanks to the number of buttons available on the body, you shouldn't feel it's a feature that is desperately lacking – and its absence helps to keep the price low. 📷



## Digital Camera

## FEATURES

★★★★★

## IMAGE QUALITY

★★★★★

## BUILD/HANDLING

★★★★★

## VALUE

★★★★★

## Overall ★★★★★

**WE SAY:** Canon has produced a reliable camera capable of creating some beautiful images. If you're in the market for your first digital SLR, and you're OK with a no-frills purchase, the 1200D is a great option.

## &gt; THE SPECS

<b>Sensor</b>	18 million pixel APS-C CMOS sensor (22.3x14.9mm)
<b>Focal length conversion</b>	1.6x
<b>Memory</b>	SD/SDHC/SDXC
<b>Viewfinder</b>	Optical viewfinder, 95% coverage, 0.87x magnification
<b>Video resolution</b>	Full HD (1920x1080)
<b>ISO range</b>	100-12800 (25600 extendable)
<b>Autofocus points</b>	9
<b>Max burst rate</b>	4fps
<b>LCD screen size</b>	Touchscreen 3-inch, Clear View II TFT, approx 1040k dots
<b>Shutter speeds:</b>	1/4000 sec – 30 seconds
<b>Weight</b>	407g (body only, including battery and memory card)
<b>Dimensions</b>	116.8x90.7x69.4mm
<b>Power supply</b>	LP-E12 rechargeable Li-Ion battery



SSR Canon EOS 100D &gt; £479 (with

18-55mm lens) &gt; www.canon.co.uk

# Tiny temptress

The EOS 100D is one diminutive SLR, but small doesn't necessarily mean beautiful. **Amy Davies** sees if size really does matter

Over the past couple of years, the interchangeable lens market has shifted significantly. Where once the DSLR was the undisputed king of the world, compact system cameras are making headway and threaten to steal their crown.

Although Canon finally introduced its own CSC in the shape of the EOS M last year, it failed to excite consumers, making little impact on now well-established brands like Panasonic and Olympus.

Perhaps in response to that, it has introduced the EOS 100D, the world's smallest and lightest DSLR. With a body size that's roughly 25% smaller, and 28% lighter, than the EOS 650D, Canon's engineers have really gone to town in miniaturising this model.

## FEATURES

Pretty much all of the interior electronics have been shrunk down to fit the slimline chassis, while the sensor, although thinned, remains APS-C sized with 18 million pixels. It's a hybrid CMOS AF II sensor, the second generation of the type of sensor which was found in the 650D and EOS M. This has phase detection pixels to assist with autofocus when shooting video or using Live View.

Aiming this camera somewhere between the M and the 650D, there's a range of fun features on board. A number of digital filters have also been included, but you can now see how these effects will be rendered on the screen (when shooting in Live View) before the shot is taken.

Despite being roughly the same size as some of the compact system cameras on the market, the 100D still has room for an optical viewfinder that boasts 0.87x magnification and 95% coverage.

It has a smaller battery than the 650D, which Canon says is capable of around 380 shots. The in-built flash has a guide number of 9.4, compared with the 650D's number of 13.

Like the 650D and the EOS M, the 100D has a capacitive touchscreen. It is fixed, unlike the 650 and 700, which have articulating screens.

Although it is a lot smaller than Canon's other DSLRs, it still retains the standard EF-S lens mount, making it compatible with the company's huge range of optics, as well as those from third party manufacturers. Of course, unlike CSC optics, these remain quite large – in other words, don't expect the entire system to be smaller just because the 100D has been shrunk down.

**Above** The EOS 100D weighs just 407g, including the battery and the memory card

## BUILD AND HANDLING

The first thing to obviously notice about the 100D is its size and weight. Compared with other entry-level cameras at this price point, it is indeed very small, with a body size roughly the same size as something like the Panasonic G5.

That said, despite its small size, the button layout of the camera is very good – it doesn't feel too cramped or awkward. There's a good chunky grip, making it feel secure in the hand, even when shooting one-handed. The majority of the buttons can be accessed with the thumb, and if you've ever used a Canon DSLR before, you'll be immediately at home.

A mode dial on top of the camera can be used to quickly flick between the different shooting modes, including fully automatic, fully manual and semi-automatic (such as Aperture Priority and Shutter Priority) modes.



## Zooming in on the... Canon EOS 100D

A quick tour of the camera's key features



You don't have to use the touchscreen if you prefer buttons



Switch to video shooting mode to capture those off-the-cuff moments



Filters can't be shot in raw, but you can use Extra Effect Shot mode



Overall system size isn't reduced, due to large optic compatibility

◀ FEELING TREATED



Despite its small size, Canon has managed to include a traditional optical viewfinder – good news for those who dislike EVFs



During Live View, the 100D uses hybrid autofocus for better accuracy. You can preview digital filters when shooting in this way



Press this button to quickly access the Quick Menu to make changes to common settings, such as white balance

The 100D has 9 autofocus points, but only the centre is the sensitive cross-type



Here you'll also find Creative Auto, which is intended as a guide for beginner photographers, providing a way to achieve effects such as background blur, without using photographic language.

Movie mode, which used to be incorporated onto the mode dial of older Canon DSLRs, is now accessed via the on/off switch, to save pushing the mode dial all the way around.

As you might expect, there are fewer buttons on the back of the 100D to directly access certain settings. However, there is a button to access a Quick Menu, which enables

**“Everything that can be done via the touchscreen is also possible using physical buttons”**

you to scroll through the most commonly used settings, such as white balance and metering. You can use a combination of the arrow keys and the scroll dial on front of the camera to make changes or, if you prefer, a combination of the touchscreen and the scroll dial.

The touchscreen element perhaps really comes into its own when

reviewing images, enabling you to swipe through shots and pinch to zoom to quickly check accurate focus. When shooting in Live View, you can also use the touchscreen to change the focus point and activate the shutter release – something which is particularly useful when creating movies, or using the camera from a more awkward position.

One of the great things about the 100D's design is that if you don't like the touchscreen, you don't have to use it. Everything that can be done via the touchscreen is also possible using physical buttons.

Canon has incorporated a number of digital filters on the EOS 100D, but accessing them is a little idiosyncratic. When operating in the majority of shooting modes, such as Aperture Priority, you can only use them when in Live View. You're also unable to shoot with them when raw format is enabled. Filters are more quickly accessible from the Creative Auto mode, but then you lose control over other elements, such as shutter speed.

A number of Picture Styles are included as presets, such as Landscape and Monochrome. These

### Meet the rivals...

See how the EOS 100D stands up against the competition



**Nikon D3200**  
£349 (with 18-55mm lens)  
Almost the perfect SLR for beginners, there are minor niggles with the colour accuracy of the rear LCD.  
Reviewed: issue 127  
★★★★☆



**Sony a58**  
£359 (with 18-55mm lens)  
This fixed translucent mirror DSLT is a good option for a first time interchangeable lens camera buyer.  
Reviewed: issue 141  
★★★★☆

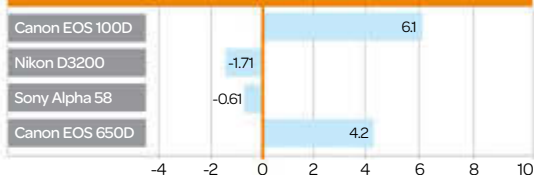


**Canon 650D**  
£580 (with 18-55 mm lens)  
With its touchscreen, Hybrid AF and other functions, it transforms the way you use an SLR.  
Reviewed: issue 129  
★★★★☆

## SLR BENCHMARKS

See how the 100D fared in our tests

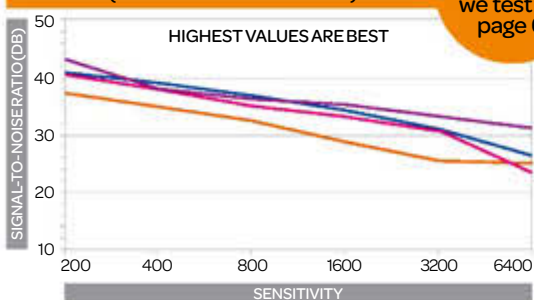
## COLOUR ERROR Closest to zero is best



**COLOUR ERROR RESULT:** Good natural colour with a touch of vibrance, JPEGs direct from camera need very little enhancement.

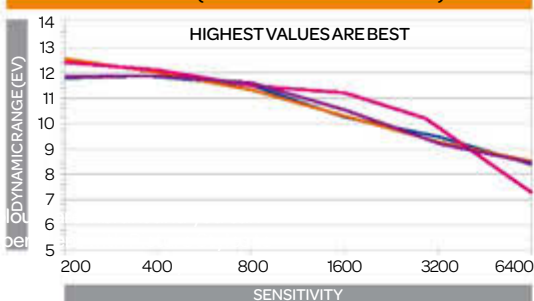
**KEY** Canon EOS 100D (purple), Nikon D3200 (pink), Sony Alpha 58 (orange), Canon EOS 650D (blue)

## RAW NOISE (AFTER CONVERSION TO TIFF)



**NOISE RESULT:** Despite its small size, the 100D not only compares well, but actually out performs all cameras here at higher sensitivities.

## RAW DYNAMIC RANGE (AFTER CONVERSION TO TIFF)



**DYNAMIC RESULT:** While beaten at some sensitivity across the range, the 100D produces results that closely relate to the others.

## OVERALL BENCHMARK RESULT

The 100D's JPEGs have a similar signal-to-noise ratio to those from the 650D, producing slightly greater ratios than the Nikon D3200 at every sensitivity and slightly weaker than the Sony a58 at ISO400 and above. The raw signal to noise ratio results are almost identical to the 650D and better than the D3200 and a58. Raw images show the a58 beats the 100D at the lowest sensitivities, but above ISO800 the Canon comes out on top.

can be accessed via the quick menu, and unlike digital filters, they can be shot in both raw format and when using a standard shooting mode. There's also space for up to three of your own custom preset modes, if you want to create your own style, such as high contrast black and white.

## PERFORMANCE

What the Canon engineers have achieved in shrinking down the key

**Above That 18 million pixel sensor puts in a very similar performance to the EOS 650D**

components of the DSLR is pretty remarkable, and we haven't been disappointed by the 100D's image performance. That 18 million pixel sensor is capable of resolving lots of detail, with minimal evidence of image smoothing at lower sensitivities.

Colours from the camera are also excellent, being nice and vibrant without going over the top. Having the ability to experiment with Picture Styles also gives you the opportunity to boost elements such as saturation if you think the scene requires it.

Automatic white balance does a good job in the majority of conditions, but it does tend to favour slightly

warmer tones when faced with artificial lighting. Switching to a more appropriate white balance setting is quick enough, though, if you're not satisfied with its performance.

The 100D uses Canon's iFCL metering. Evaluative metering, as general-purpose metering is known on Canon DSLRs, is a reasonable performer, helping the camera to produce balanced exposures in the majority of conditions. However, if a scene has high contrast the camera struggles and it will under- or over-expose depending upon the brightness of the active AF point. In some ways it acts more like







centrewighted, or even spot metering because the exposure is significantly skewed towards getting the subject under the AF point just right.

Noise performance is very good, with lots of crisp detail even at mid-range sensitivities such as ISO400. From around ISO1600, the amount of luminance and colour noise does increase, but it's not particularly noticeable at printing and normal web sizes. Even images shot at ISO3200 are usable in small sizes, though if you zoom in 100%, noise is apparent, along with a loss in detail.

Autofocus performance while shooting through the viewfinder is excellent, locking onto subjects quickly and easily. Only the central AF point is a cross-type, so this is more sensitive – you might want to keep the focus point to this central point and focus and recompose if you're attempting to capture rapidly unfolding action.

**Above** Shooting in Landscape picture style emphasises the greens and blues in a scene

**Below** The standard kit lens comes complete with STM autofocus



Unfortunately, autofocus speed drops dramatically when using Live View, despite the hybrid autofocus system. You could be waiting for a few seconds for the camera to finish hunting around for focus, and it's certainly no match for the likes of the Olympus PEN E-PL5 or Panasonic G5 with their near instant autofocus capabilities.

Those put off by electronic viewfinders will enjoy the OVF on the EOS 100D. Although quite small, it still gives a clear and bright view. It's worth bearing in mind that it doesn't give a 100% field of view, unlike the majority of EVFs. Although not articulating, the 100D's 3-inch screen gives a reasonable angle of view if you need to shoot from awkward angles.

It's nice to see Canon considering its audience by including filter effects on the 100D, and a few here are good fun to play with – it's certainly worth experimenting if you like that kind of thing. We particularly like Grainy Black and White and Toy Camera effect.

## VERDICT

What Canon has managed to produce in the EOS 100D is pretty special – a very small body that retains the same DSLR stylings, and more importantly, produces a similarly impressive image quality to its siblings. However, the problem remains that although the

## Tech Briefing

### Hybrid AF focusing




**D**ebuting last year on the 650D, the hybrid autofocus system works by combining phase detection and contrast detection for a system that is supposed to utilise the best factors of both. Generally, phase detection is quicker, while contrast detection more accurate. It works by incorporating certain pixels on the camera's sensor, working first to get the subject in focus, then fine-tuning with contrast detection. The hybrid autofocus system is only used when shooting in Live View mode.

In the 100D, phase detection pixels now cover around 80% of the sensor's surface, which should make it better in terms of speed and tracking performance.

camera itself is small, the overall system is not. By the time you attach the 18-55mm kit lens, it's not too much smaller than other, cheaper, cameras in Canon's range. Furthermore, if you're intending to use several lenses, you will still need a pretty large kit bag.

It's worth looking into the 40mm pancake lens as an accompaniment, since its incredibly small size makes it a reasonable combo for street shooting – albeit with a longer (equivalent) focal length than we'd usually recommend for such work.

The new 18-55mm STM kit lens is also a very good performer, and if this is your first SLR then it's worth buying the standard kit box, rather than going for the body only. 

## Digital Camera

FEATURES	BUILD/HANDLING
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** The 100D produces excellent images and is a fantastic choice for the first-time DSLR buyer. However, with large lenses and accessories, downsizing the camera doesn't really mean too much.





**SLR** Canon EOS 760D £650 body only; EOS 750D £600 body only, £690 with EF-S 18-55mm f/3.5-5.6 IS STM lens

# Canon EOS 750D & Canon EOS 760D

Canon releases the EOS 750D/760D D-SLR double-act. Inside they're the same, but they're aimed at different users

## Canon EOS 750D & EOS 760D

These top views reveal two very different camera layouts...



The 750D has its Mode dial on the right, like the 100D, 1200D and 700D entry-level cameras

The 760D has its Mode dial on the left to make room for the top LCD, like the enthusiast's 70D

**W**e knew the entry-level Canon EOS 700D replacement was due this year, but we were expecting one camera, not two! Canon's announcement of two new cameras is just one part of the story. The other is that they use a brand-new 24-megapixel sensor, made by Canon, which features the latest version of its Hybrid CMOS AF system.

This uses phase-detection 'focusing' pixels spread across the sensor to aid faster autofocus in Live View mode and when shooting movies. This latest Hybrid CMOS AF III in the 750D and 760D has more focusing pixels arranged in a more





With a larger 24-megapixel sensor, the 750D and 760D will help you capture more detail in landscape shots

regular array, and Canon says it's about four times faster than version II (used in the EOS 100D) and two generations ahead of the original Hybrid CMOS AF system in the EOS 700D. The 24-megapixel sensor is especially interesting because this gives the 750D and 760D parity with rival Nikon D-SLRs like the D3300 and D5500. It's also a sign that Canon could be pensioning off the venerable 18-megapixel CMOS sensor still used in the old 700D and EOS 100D.

The increase in resolution hasn't harmed the ISO range, though, which goes from ISO 100-12,800 (25,600 in 'expanded' mode). The processing is handled by Canon's DIGIC 6 processor, a step up from the DIGIC 5 processor used in the 100D and 700D. Both cameras offer a 5fps maximum continuous shooting rate and Canon's more powerful 19-point AF system (all cross-type), compared to the 9-point AF on the existing entry-level models.

Round the back, they both have articulating 3-inch touchscreen displays with a resolution of

From bright sunshine to dark interiors, the new cameras will tackle all conditions

Like the 700D, the 750D and 760D have a highest native ISO of 12,800 to enable shooting in low-light conditions

1,040,000 dots, and both cameras can shoot Full HD movies at 30fps, 25fps and 24fps. They also feature Canon's new Flicker Detection technology, first seen in the EOS 7D Mark II, for more reliable exposures under artificial light.

### EOS 750D VS EOS 760D

So what's the difference? It's all about the body design rather than the specs and features. Both cameras will be part of Canon's entry-level EOS lineup, but they're aimed at different kinds of user. The EOS 750D is aimed at beginners who want the reassurance of automatic modes and simpler controls of the kind they might be used to on a compact camera.

The EOS 760D, however, is designed for enthusiasts who want more creative and manual control.

This is the one to choose if you already know the basics and want to move on. There's little difference in the size and weight, but the 760D swaps the Mode dial over from the right side of the camera to the left to make room for a mono status LCD top-right. This displays key shooting information in a clearly visible way without the need to check the more power-hungry LCD on the back. Its layout is a cut-down design of more advanced enthusiast D-SLRs like the 70D and 7D Mk II. The 760D also has a second control dial on the rear. This makes changing key camera settings much quicker, especially when shooting in the semi-automatic or manual modes where you want to adjust the shutter speed and lens aperture independently.

Although the 760D aimed at more advanced users, the prices are not that

**"The 24Mp 760D and 750D become Canon's highest resolution APS-C D-SLRs, eclipsing the enthusiast 20Mp 70D and 7D Mark II"**







Both the 750D and 760D are likely to be popular with those wanting to capture great portraits of their families



- ❶ The cameras have new Hybrid CMOS AF III autofocus tech for sharp and smooth focusing via the touchscreen LCD when using Live View for stills or HD videos

## Tech specs EOS 750D vs EOS 760D vs EOS 700D



	750D	760D	700D
<b>Megapixels</b>	24.2Mp APS-C format CMOS	24.2Mp APS-C format CMOS	18Mp APS-C format CMOS
<b>Image processor</b>	DIGIC 6	DIGIC 6	DIGIC 5
<b>AF points</b>	19 cross-type (f/2.8 at centre)	19 cross-type (f/2.8 at centre)	9 cross-type (f/2.8 at centre)
<b>ISO range</b>	100-12,800 (25,600 expanded)	100-12,800 (25,600 expanded)	100-12,800 (25,600 expanded)
<b>Raw quality</b>	Raw (14-bit CR2)	Raw (14-bit CR2)	Raw (14-bit CR2)
<b>Max image size</b>	6000x4000 (Raw/Large JPEG)	6000x4000 (Raw/Large JPEG)	5184x3456 (Raw/Large JPEG)
<b>Shooting modes</b>	Scene Intelligent Auto, No Flash, Creative Auto, Portrait, Landscape, Close-up, Sports, SCN (Kids, Food, Candlelight, Night Portrait, Handheld Night Scene, HDR Backlight Control), Program, Tv, Av, Manual	Scene Intelligent Auto, No Flash, Creative Auto, Portrait, Landscape, Close-up, Sports, SCN (Kids, Food, Candlelight, Night Portrait, Handheld Night Scene, HDR Backlight Control), Program, Tv, Av, Manual	Scene Intelligent Auto, No Flash, Creative Auto, Portrait, Landscape, Close-up, Sports, SCN (Night Portrait, Handheld Night Scene, HDR Backlight Control), Program, Tv, Av, Manual
<b>Metering zones</b>	63 (7,560-pixel RGB+IR sensor)	63 (7,560-pixel RGB+IR sensor)	63
<b>HD video</b>	Full HD 1080p at 30, 25, 24fps	Full HD 1080p at 30, 25, 24fps	Full HD 1080p at 30, 25, 24fps
<b>Viewfinder</b>	95% coverage, 0.82x magnification	95% coverage, 0.82x magnification	95% coverage, 0.85x magnification
<b>Memory card</b>	SD, SDHC or SDXC card	SD, SDHC or SDXC card	SD, SDHC or SDXC card
<b>LCD</b>	Vari-angle 3in touchscreen 1,040K dots	Vari-angle 3in touchscreen 1,040K dots	Vari-angle 3in touchscreen 1,040K dots
<b>Top-plate LCD</b>	No	Yes	No
<b>Quick Control dial</b>	No	Yes	No
<b>Max burst</b>	940 JPEGs or 8 Raws at 5fps	940 JPEGs or 8 Raws at 5fps	30 JPEGs or 6 Raws at 5fps
<b>Wi-Fi/NFC</b>	Yes/Yes	Yes/Yes	No/No
<b>Size</b>	131.9 x 100.7 x 77.8mm	131.9 x 100.9 x 77.8mm	133.1 x 99.8 x 78.8mm
<b>Weight (body)</b>	555 grams	565 grams	580 grams
<b>Body only price</b>	£600 (RRP)	£650 (RRP)	£470 (street price)

dissimilar. The EOS 760D will cost £650, body only, while the EOS 750D will cost £600 body only or £690 with Canon's EF-S 18-55mm f/3.5-5.6 IS STM kit lens. Both cameras go on sale from April 2015.

Canon says that they're additions to the EOS range rather than replacements, and they are designed to slot in between the EOS 700D and EOS 70D.

Putting aside any potential bafflement over which model to buy, and why there are two at all, the EOS 750D and 760D represent a real step forward, with a newer, higher-resolution sensor and much improved autofocus – we look forward to giving them the full test treatment soon.



The Canon EOS 760D (top) is like the EOS 750D's bigger brother – and aimed at more experienced D-SLR novices

# THE NEW EOS 750D & 760D VS EOS 700D

How do Canon's two new 24.2Mp EOS D-SLRs compare against the older 18Mp EOS 700D?



**T**he Canon EOS 700D was more evolution than revolution when it launched in 2013. The three real differences between the 700D and 650D were: the 700D introduced a new mode dial that rotated 360 degrees, it had a more durable external finish and it offered real-time previews of its Creative Filters in Live View mode. Let's take a look at the key differences between the 700D versus the new 760D and 750D.

## 01 SENSOR AND PROCESSOR

The EOS 760D and 750D feature a new 24.2Mp CMOS sensor, an increase of just over 6Mp on the 18Mp 700D. So, while 700D Raw files and Large JPEGs are 5184x3456 pixels (43.89 x 29.26cm at 300dpi), the maximum image size from the 760D/750D is 6000x4000 pixels (50.8 x 33.87cm at 300dpi).

This makes the 760D and 750D Canon's highest resolution APS-C D-SLRs, eclipsing the higher-specced enthusiast 20.2Mp EOS 70D and 7D Mark II cameras.

The 700D has a DIGIC 5 processor, the new cameras get DIGIC 6. This brings enhanced AF and high-ISO performance, although the sensitivity range, which runs from ISO 100 to 12,800 and is expandable up to ISO 25,600, is the same as the 700D's. This processor also extends the 5fps continuous shooting burst from six Raws

and just 30 JPEGs in the 700D to eight Raws and 940 JPEGs.

## 02 AUTOFOCUS

While the EOS 700D offers nine cross-type AF points (f/2.8 at the centre), the 760D and 750D include 19 cross-type AF points (with f/2.8 at the centre). That's the same system used in the 70D. The 760D and 750D also feature the latest Live View AF system – Hybrid CMOS AF III – which provides focus tracking. It's useful for movies, enabling you to smoothly shift the focus point in real time using the Vari-angle touchscreen.

## 03 WI-FI AND NFC

In a first for the xxxD line, Canon has introduced Wi-Fi and NFC (Near Field Communication) compatibility with both the 760D and 750D. This enables you to control the camera remotely using a mobile device loaded with Canon's EOS Remote app, to print to a Wi-Fi enabled printer, and the chance to share images and videos wirelessly to a social network.

## 04 CONTROLS

The EOS 700D uses stainless steel in its construction, but the 760D and 750D feature aluminium alloy bodies instead. The new cameras show a moderate weight-saving: 565g (760D) and 555g (750D) compared with the 700D's 580g. The two

new cameras are almost identical in specification, but differ in ergonomics. On the 750D, Canon has stuck with the familiar four-way controller seen on the 700D. But the 760D gets a Quick Control dial. This offers a convenient way to access exposure compensation, as well as navigate menus and make changes on the Quick Control screen. At the centre of the dial is a four-way pad that enables the white balance, autofocus mode, drive mode and picture style parameters to be directly selected.

Additionally, the 760D gets a top-plate LCD, so you can quickly check the ISO, aperture, shutter speed, exposure compensation and other settings, and make adjustments without having to look through the viewfinder or check the rear display. This can save time and battery life.

## 05 CLEVER VIEWFINDER

Both the 760D and 750D get an 'Intelligent Viewfinder' that uses a transmissive LCD, like the 70D, 7D/7D Mk II and 5D Mk III. This enables the focus area to be highlighted, in addition to the active focus point. The 760D also displays a level in the viewfinder. All three Canon 7xxDs offer approximately 95% coverage in the viewfinder.

## 06 METERING AND EXPOSURE

All three cameras offer 63-zone Evaluative metering, but the EOS 760D and 750D uses a 7,560-pixel RGB metering sensor that takes colour and near-infrared light to determine exposures. Plus the 760D and 750D get the latest Canon EOS scene analysis system. And whereas the 700D's Partial metering covers 9% of the viewfinder and the Spot meter measures 4%, the 760D/750D's Partial metering uses 6% and 3.5% for Spot metering.

## 07 HD MOVIES

All three cameras record Full HD 1080p movies at 30, 25 or 24fps. However, while the EOS 700D uses MOV files, the 760D and 750D movies are saved in MP4 format – the smaller file sizes making it easier to transfer movies and share them online. 📺



Both the 760D and 750D now come equipped with Wi-Fi and NFC functionality



## &gt; THE SPECS

Sensor	APS-C format 20.2MP CMOS
Focal length conversion	1.6x
Memory	SD/SDHC/SDXC and CF
Viewfinder	Pentaprism with 100% coverage
Max video resolution	1,920 x 1,080 pixels
ISO range	100-16,000 (expandable to ISO 51,200)
Autofocus points	65
Screen	3-inch 1,040k-dot LCD
Shutter speeds	30-1/8,000 sec plus Bulb
Weight	820g (body only)
Dimensions	148.8 x 112.4 x 78.2mm
Power supply	Rechargeable Li-ion LP-E6N battery (supplied)



SLR Canon EOS 7D Mark II > Body only: £1,599 / \$1,799 > [www.canon.co.uk](http://www.canon.co.uk)

# A good sport

Is the 7D Mark II worth the five-year wait for the upgrade to Canon's most enthusiast-friendly SLR? **Angela Nicholson** finds out

**A**s you might guess from its name, the new Canon EOS 7D Mark II replaces the Canon 7D. It therefore assumes its place above the APS-C format Canon 70D and below the full-frame Canon 5D Mark II in the Canon SLR line-up. Inside is a new 20.2-million-effective-pixel sensor with redesigned micro-lenses that allow more light to pass through onto the photo diodes.

To boost performance and enable a maximum continuous shooting rate of 10 frames per second, Canon has given the new camera two Digic 6 processing engines. When a UDMA 7 CF card (such as the Lexar Professional 1066x card) is installed, up to 31 raw files or 1,030 JPEGs can be shot in a single burst. If you need to shoot for more than 3.1 seconds, the High continuous shooting rate can be set between 2-10fps, while the Low rate can be set to 1-9fps and Silent mode to 1-4fps.

The sensor and processing engine combination also allows a native sensitivity range of ISO 100-16,000, the widest of any Canon camera. If it's not enough, there are expansion settings going up to ISO 51,200.

While the 7D has 19 autofocus points, all of which are cross-type, its replacement has a class-leading

65 points; again, all are cross-type. With f/2.8 lenses, the central point is dual-cross type for extra sensitivity and is capable of operating when lens and teleconverter combinations take the effective aperture down to f/8. It's also possible to adjust tracking sensitivity, acceleration/deceleration tracking and AF point auto switching options. There are also seven AF point selection modes.

In Live View and video mode, the Dual Pixel AF system comes into play. Videographers will love the ability to



**Above** This new switch helps speed up setting changes.

slow the focusing down to produce a more cinematic transition.

Other notable features include dual card slots (one SD/SDHC/SDXC, the other CompactFlash); an intervalometer for shooting time-lapse sequences; HDR mode (with raw file recording); multiple exposure mode; a built-in compass; and GPS to enable image geotagging. Sadly, there's no Wi-Fi connectivity built in. A Canon Europe representative told us the Mark II's metal body may compromise Wi-Fi performance.

## BUILD AND HANDLING

Canon has retained the 7D's magnesium alloy construction for the Mark II, but it has uprated its weather-proofing so that it is the second most weather-resistant Canon SLR after the 1Dx. This may in part explain the 90g increase in weight and slightly larger size. In any case, the camera feels nice and solid, and



## Stick or twist? Upgrade advice

Canon may only have increased the pixel count of the 7D Mark II by two million in comparison with the original 7D (left), but the new camera resolves noticeably more detail at most sensitivity settings. The autofocus system is also significantly upgraded,

with 65 points instead of 19, and has the same pro-level customisation options as the Canon 1Dx and 5D Mark III. The exposure metering system is the best that Canon has to offer. Travel photographers may also appreciate the addition of GPS.

## Zooming in on the... Canon 7D Mark II

A smart layout that gives you access to integrated tech



the shutter has a claimed durability of 200,000 cycles.

The grip on the front of the camera and the thumb-ridge on the back have an excellent textured coating, so they feel really secure in your hand. We found the thumb-ridge, which is thinner and more angular than the 7D's, particularly good.

Owners of the original 7D will find the Mark II familiar, but there are a

**"The images and video the 7D Mark II produces look great straight from the camera"**

few changes to the control layout. There are Rate and Creative Photo buttons, for example, as well as a new sprung selection lever around the mini-joystick control. This can

be used to change the function of the main control dial in front of the shutter release on the top of the camera. We found it useful for accessing the sensitivity options.

### PERFORMANCE

On the whole, the images and video the 7D Mark II produces look great straight from the camera. It's also capable of resolving an impressive level of detail: it matches the 24MP Sony Alpha 77II and beats the 24MP Nikon D7100 in this respect until you choose an upper sensitivity setting.

Noise is also controlled well throughout the native sensitivity range, but as usual the expansion settings (which Canon considers not of sufficient quality for normal use) are best reserved for emergency situations or when images only need to be viewed at small sizes. JPEGs captured at the maximum expansion (ISO 51,200) have luminance noise

### Meet the rivals...

The cameras taking on the 7D Mk II



**Canon EOS 6D**

Price: £1,299 / \$1,899

Full-frame yet more affordable (in the UK), the 6D is a great camera, if less serious than the 7D Mk II.

Reviewed: issue 135



**Nikon D7100**

Price: £758 / \$947

Superb detail and excellent AF performance but a little hampered by a restricted buffer capacity. Great price.

Reviewed: page 52



**Sony Alpha 77 II**

Price: £849 / \$898

Sony's best SLT so far has an impressive feature set and a very capable autofocus system.

Reviewed: page 104



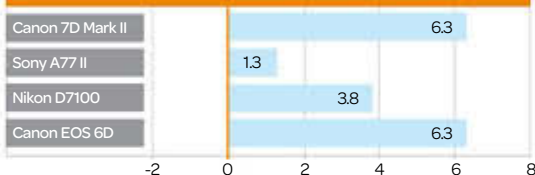


WHAT'S THIS?  
Find out how we test on page 6

## CAMERA BENCHMARKS

How does the 7D Mark II measure up?

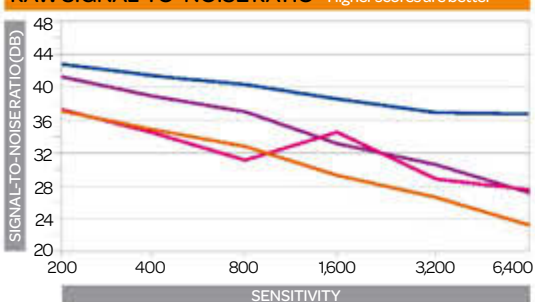
## COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** Like other Canon cameras, the 7D Mark II isn't the most accurate, but images have very pleasant saturation.

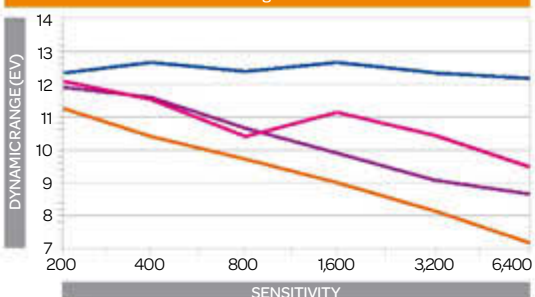
**KEY**  
■ Canon 7D Mark II  
■ Sony A77 II  
■ Nikon D7100  
■ Canon EOS 6D

## RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The 7D Mark II beats the APS-C cameras at low-to-middle sensitivity settings, so its image noise is not excessive.

## RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** The 7D Mark II falls behind the Nikon D7100 from about ISO 800 upwards. The full-frame Canon 6D stands out.

## OVERALL BENCHMARK RESULT

The 7D Mark II makes a significant improvement upon the original 7D at the vast majority of its sensitivity settings. It also manages to out-resolve the Canon 6D at in the ISO 100-3200 range, but the larger sensor still brings advantages to noise control and dynamic range.

\* Raw results use images converted to TIFF

visible at most normal viewing sizes, and some areas appear bruised with green and magenta. Stepping down to the uppermost native setting (ISO 16,000) results in a significant improvement in image quality. When all noise reduction is turned off, ISO 16,000 raw files have a hint of coloured speckling visible when sized to A3. Zoom in to 100% and this chroma noise becomes very noticeable, but there's still a respectable level of detail, so

Above This ISO 200 JPEG image has an impressive amount of detail.

“We’ve been looking forward to testing the Mark II’s autofocus system, and it didn’t disappoint”

it’s possible to find a good balance between the two in post-processing.

At the other end of the sensitivity scale, there’s just a hint of luminance noise in some areas at 100% (even at ISO 100), but images have lots of detail visible.

One of things that impressed us most about the 7D Mark II during our testing is its new 252-zone metering system, which gathers data from a 150,000-pixel RGB and infrared sensor. In the past, we have found Canon’s iFCL metering system a little frustrating in Evaluative mode: it can put too much weighting on the brightness of the subject under the active AF point, so you can end up with badly over- or under-exposed shots in high-contrast conditions. It acts more like centre-weighted metering than some other systems.

The new system in the Mark

II does a better job of taking the brightness of the whole scene into account. Naturally, there is still some weighting applied, but we found there are fewer occasions when exposure compensation is required.

That said, there seems to be a slight tendency towards bright images. Some of our landscapes shot in bright conditions look better when the exposure is reduced by about 1/3EV, either in-camera or post-capture.

As we have found in the past with Canon SLRs, the 7D Mark II’s automatic white balance system does a great job of capturing the atmosphere of the scene. In bright sun, it produces pleasingly warm tones; in overcast conditions, it captures the coolness without going overboard and giving a blue tint. Overall, the results look natural. The Standard Picture Style also provides a good general-purpose setting that generates JPEGs with pleasant colours and decent saturation.

We’ve been looking forward to testing the 7D Mark II’s 65-point







autofocusing system, and it didn't disappoint. It's both fast and accurate, and capable of working in very low light. It's also complex and takes some

**Above** The auto white balance system captures the warm light well in this shot.

getting to know. Provided that you select the correct AF point selection mode and AF AI servo characteristics (which can be set via a selection of shooting scenario Case Studies), it does a great job. We found Case 1 in the selection list a good starting point that worked well when shooting BMX riders in action.

In addition, the hybrid AF system, which is available when composing video or still images on the LCD screen in Live View mode is capable and able to find its target, even when you're shooting in quite low light. With an STM lens mounted, there's little back-and-forwards adjustment, even in fairly dull conditions. Although it's quite a large camera to use held away from your body, it's possible to use Live View when hand-holding the camera.

Switching from Standard to the slowest AF setting in the Movie Servo AF speed options has a significant impact upon the time the camera takes to focus the lens. Either way, it moves the subject smoothly into focus. If you need to speed things up when using the slowest setting, however, pressing the AF-on button gets the subject sharp quickly.

**Left** The 18-135mm kit lens isn't the sharpest optic, but it's a good start.



## VERDICT

Enthusiast photographers shoot a bit of everything, so they need a versatile camera. The EOS 7D Mark II's weatherproofing means that it can be used in harsh conditions, and its autofocus system gets moving subjects sharp quickly. The metering system delivers correctly exposed images in a wide range of conditions. Noise is also controlled well, colours are pleasantly rendered and images have an impressive amount of detail.

It's not often we recommend upgrading a model to its immediate successor, but the Mark II is an exception. It's a great update. 📷

Digital Camera			
FEATURES	★★★★★	BUILD QUALITY	★★★★★
IMAGE QUALITY	★★★★★	VALUE	★★★★☆

**Overall** ★★★★★

**WE SAY:** Canon's best APS-C format SLR to date, the 7D Mark II has bags of appeal to the enthusiast wedded to the idea of an SLR rather than a compact system camera. It's even worth it if you already own a 7D.



## &gt; THE SPECS

Sensor	22.3-million effective pixel full-frame (36x24mm) CMOS
Focal length conversion	1x
Memory	CF and SD/SDHC/SDXC
Viewfinder	Pentaprism, with 100% coverage
Video resolution	Full HD (1920x1080 pixels) at 24, 25 and 30fps
ISO range	100-12800 (expandable to 50 and 102400)
Autofocus points	61 (41 cross-type, five dual cross-type)
Max burst rate	6fps
LCD	3.2-inch, 1040,000-dot Clear View II TFT
Shutter speeds	30 to 1/8000 sec, plus Bulb
Weight	950g (body only)
Dimensions	152x116.4x76.4mm
Power supply	Rechargeable Li-ion LP-E6 (supplied), 1x CR1616 for date and settings



FULL-FRAME SLR Canon EOS 5D Mark III > £2,299 (body only) > [www.canon.co.uk](http://www.canon.co.uk)

**T**he original Canon EOS 5D was the first SLR to really bring full-frame digital photography within the reach of enthusiast photographers. Then its replacement, the 5D Mark II, kick-started the trend for shooting video on an SLR, and now the 5D Mark III has lots to offer the enthusiast too.

## FEATURES

With 22.3Mp effective pixels, the 5D Mark III's sensor only has 1.2 million pixels more than the 21.1Mp Mark II it replaces, but that's still 4.2Mp more than the 18.1Mp EOS-1D X, which sits at the top of Canon's SLR line-up.

The Mark III has a DIGIC 5+ processor, which in combination with its eight-channel readout means it has a top continuous shooting speed of six frames per second (fps).

This processor also enables sensitivity to be set in the ISO range of 100 to 25600, and it can be expanded to include L: ISO50, H1: ISO51200 and H2: ISO102400.

In addition, the camera has the same 61-point wide-area AF system as the flagship EOS-1D X. Of these 61 points, 41 are cross-type and five are dual cross-type, which is good news for accuracy. The customisable AF presets introduced in the EOS-1D X are also available. At launch the 5D Mark III didn't offer the f/8 sensitivity of Nikon's system, but a firmware update corrected this, which is great for teleconverter users.

Existing 5D Mark II users may find the Mark III's iFCL metering takes

# Pro quality, premium price

Apart from its pixel count, the specification of the Canon EOS 5D Mark III seems similar to the Mark II, but there's still plenty to get excited about, says **Angela Nicholson**

a little getting used to, because it reacts in a similar way to Centre-weighted metering and puts greater emphasis on the subject under the active autofocus point.

Video capability was one of the big successes of the 5D Mark II, and there are some improvements in the Mark III. Firstly, there's the introduction of a Live View/Movie switch on the rear, as on the 7D, to speed up movie activation. There's also a headphone socket for monitoring the stereo audio, which can be adjusted in-camera, as on the EOS-1D X.

The 5D Mark III is also capable of recording and merging three shots to

**Above** The 5D Mark III's familiar shell is packed with powerful features

produce a high dynamic range (HDR) image. This is extremely useful, because it records all three shots as well as the processed HDR image, and if you shoot raw and JPEG images simultaneously, you'll find you have a total of seven images, including three raw files that you can process yourself if you wish. The 5D Mark III also has two card ports — one for CompactFlash and the other for SD format cards, but there's no XQD card port.

## BUILD AND HANDLING

According to Canon, the 5D Mark III has better weatherproofing than the Mark II. This is something that's



Press this button when reviewing images to add a star rating out of five



Sound input can be adjusted – something Mark II users asked for



Canon's full-frame cameras don't have a pop-up flash built-in



The AF point mode selection options are difficult to distinguish

## Zooming in on the... Canon EOS 5D Mark III

A quick tour of the camera's key features

Use this switch to swap between stills and video modes. Pressing the central button in video mode starts recording, while in stills mode it activates Live View



This button on the top of the camera is used to toggle through the AF point selection options



Canon suggests some AF system arrangements – to specify response times for specific shooting conditions, for example

There's a headphone port for monitoring audio quality, and the sound levels can be adjusted in-camera



difficult to test in the short term, but it's reassuring to know.

The camera is large and the finger grip is covered in a textured rubber-like coating that helps it feel secure in your grasp, and the contours make it comfortable to hold. The Mark III's body is largely unchanged from the Mark II's, but there are a few key differences. The pentaprism lump on the top, for example, is a little larger and more rounded to accommodate the AF module, which is 2.5x larger than that seen on the Mark II.

There's also the Live View/Movie switch on the back of the camera,

**“Pressing the Creative button in playback mode allows two shots to be compared next to each other”**

which is within easy reach of the right thumb. In addition, Canon has added a couple of new buttons. The first of these is used to access three creative options: Picture Styles, Multiple Exposure (up to nine images can be combined) and the HDR modes.

Another new button is marked Rate, and pressing it in playback mode allows you to rate your images – one

press for one star, two for two, and so on. These ratings are logged in the EXIF data and are visible in Adobe Bridge and Elements. We found the Rate feature extremely useful when reviewing images taken during this test, because it makes chimping on the bus or train home from a shoot productive. You may not use it to make your final image selection, but it's useful for working out which are the best images to consider.

Helpfully, pressing the Creative button in playback mode allows two shots to be compared next to each other. It's rather odd that the image that's selected when the button is pressed is highlighted in blue as the one to change – using either the main dial on the back of the camera or the smaller one on the front, near the shutter release. However, pressing the Set button at the centre of the main dial switches to the second image. The Magnify and Rate buttons also function during the comparison view and act upon the selected image only.

Pleasingly, Canon has given the 5D Mark III the same three-inch 1,040,000-dot LCD as the 1D X. The gap between the screen and its glass

## Meet the rivals...

See how the Canon EOS 5D Mark III stands up against the competition



**Nikon D810**  
£2,499 (body only)  
Nikon's newest full-frame SLR has 36 million pixels and no AA filter for class-leading resolution.  
Reviewed: page 60  
★★★★★



**Nikon D800**  
£1899 (body only)  
With 36 million pixels, the recently replaced D800 is a great camera and can be found at a bargain price  
Reviewed: issue 82  
★★★★★



**Sony Alpha 7R**  
£1,510 (body only)  
Though small, this CSC has a full-frame sensor with 36 million pixels for superb detail capture.  
Reviewed: issue 147  
★★★★★

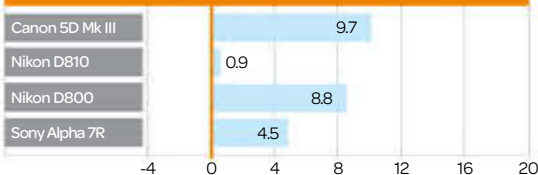


**WHAT'S THIS?**  
Find out how we test on page 6

## CAMERA BENCHMARKS

How does the Canon 5D Mark III measure up?

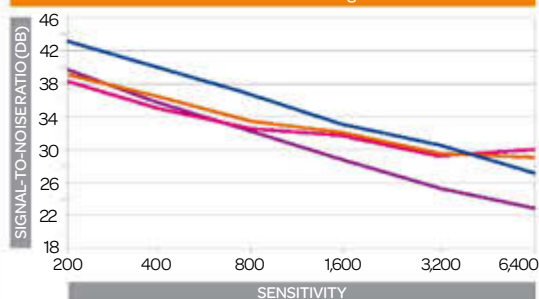
### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** The 5D Mk III is the least accurate here, but colours look very attractive straight from the camera.

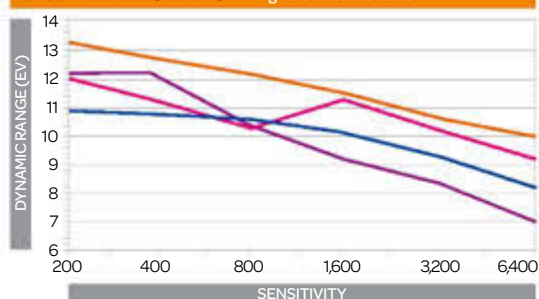
**KEY**  
■ Canon EOS 5D Mk III ■ Nikon D800  
■ Nikon D810 ■ Sony Alpha 7R

### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** A lower pixel count helps the 5D Mk III produce a higher signal to noise ratio, which means cleaner images.

### RAW DYNAMIC RANGE\* Higher scores are better

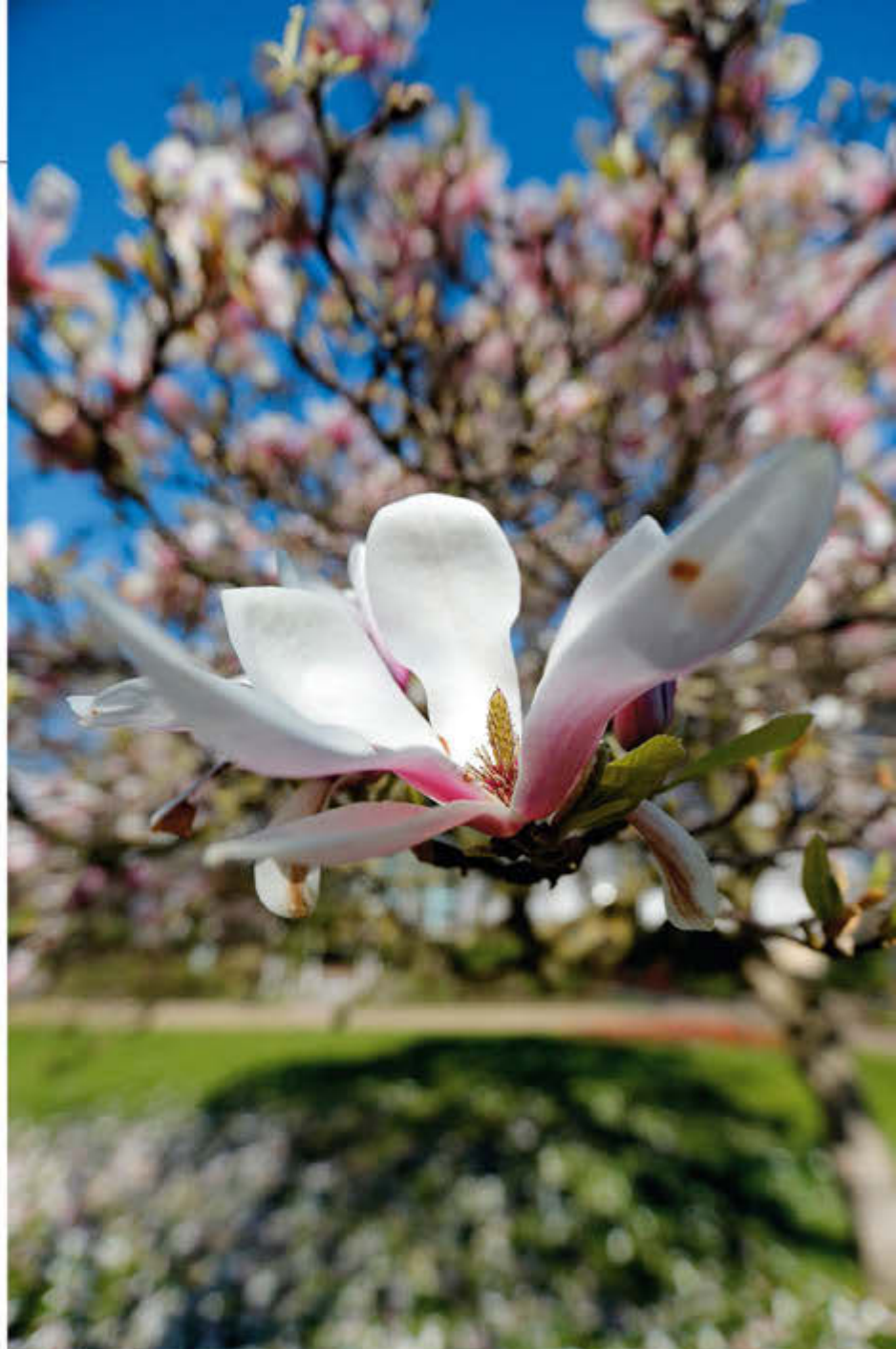


**DYNAMIC RESULT:** Dynamic range is good, but it's beaten by all but the Nikon D810 throughout the sensitivity range.

### OVERALL BENCHMARK RESULT

While the 22Mp Canon 5D Mark III can't match the 36-million-pixel cameras in this group for resolution, its images still have plenty of detail and our lab results show that the larger pixels produce a cleaner signal, which means less noise. The Canon camera's dynamic range isn't the best we have measured, but is still respectable and images have a wide range of tones and good contrast, which means they usually look good straight from the camera. The raw files also stand-up well to post-capture adjustment.

\* Raw results use images converted to TIFF



Mark III a fully articulating screen. Perhaps the hinge is considered too much of a weak point, or maybe Canon thinks that dedicated stills photographers aren't ready for such a feature yet.

### PERFORMANCE

Nikon's D810 is viewed by many as the natural competitor to the 5D Mark III. Its class-leading pixel count means the D810 is capable of resolving more detail than the 5D Mark III. What is a little surprising, however, is that the Nikon camera also produces raw and JPEG images that have a higher dynamic range when the lower sensitivity images are used. We might have expected this to be the other way around given that the pixels on the Canon camera's sensor have more space. It's only when the sensitivity of raw files is

pushed to ISO800, that the Mark III's dynamic range is higher than the D810's. Nevertheless, the 5D Mark III is very capable, and it resolves a high level of detail in both raw and JPEG files, which only really starts to dip when the sensitivity is pushed to ISO25600.

Our tests also show that from around ISO100 and above the 5D Mark III has a slightly higher signal-to-noise ratio than the D810, so images have less noise. However, as is usually the case, noise becomes quite noticeable when the upper sensitivity expansion settings (ISO51200 and ISO102400) are used, and they are best reserved for emergencies.

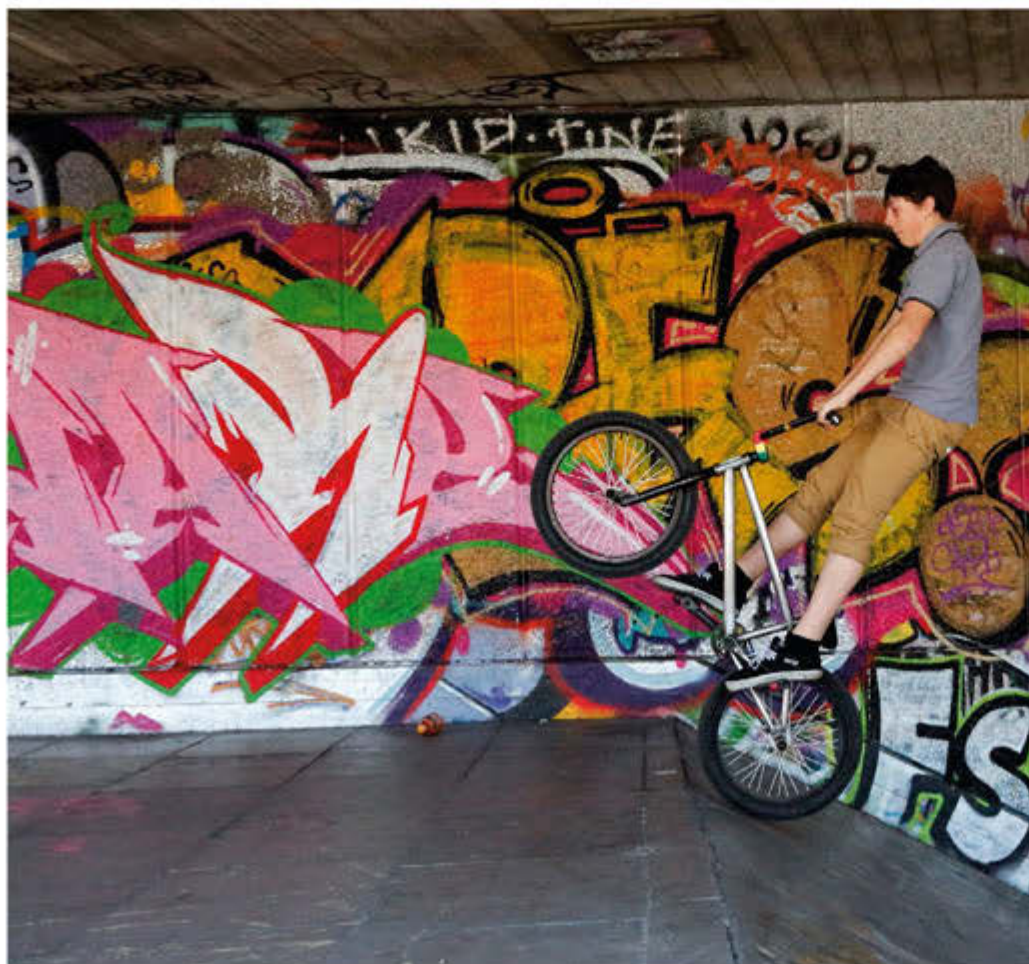
We also found that at the top settings it can struggle to render tonal gradations in some red subjects, and small patches of uniform tone appear, giving some parts of the image a

cover has been filled with an optical gel, and this helps to keep reflections at bay. In our tests, we found that the screen provides a sharp, clear view, even when shooting outside in bright sunlight.

Given the 5D's reputation as a video camera, it's a shame that Canon wasn't bold enough to give the

**Above** Both raw and JPEG images deliver delicious levels of resolution and detail





posterised appearance.

Despite these issues, the 5D Mark III produces impressive results in low light. When shooting BMX riders in dim conditions, for example, the sensitivity was pushed to ISO12800, and the JPEGs look great at A3 size. Even at 100% on a computer screen, images look respectable, with only a little mottling of luminance noise and

**Above** The AF system had no trouble keeping up with this BMX bandit

slight softening of fine details.

Canon produces one of the best white balance systems around, and the 5D Mark III's doesn't disappoint. When set to the Automatic setting, images look natural, and generally retain the atmosphere of the shooting conditions. Standard Picture Style is a great option for most situations, but others — such as Neutral, Faithful, Monochrome and Landscape — are on hand, along with three custom options, if you want a different look.

There are six AF Area Selection modes available. It takes a while to be able to distinguish between them all, and to remember which icon represents each one. On top of this, the AI Servo (continuous AF) mode's characteristics — such as tracking sensitivity, acceleration/deceleration tracking and AF-point switching — can be adjusted. Although it's complex, we found the AF system to be extremely fast and accurate.

## OUR VERDICT

Images are generally well exposed thanks to Canon's iFCL metering, though care is needed in high

**Below** The 5D's top-plate LCD makes it easy to make adjustments on the fly



## Tech Briefing Silent Shooting mode



**W**ildlife photographers may find the 5D Mark III's Silent Shooting mode useful, because unlike other quiet modes, it doesn't rely on the mirror being held up after the shot has been taken until it is manually dropped. Instead, the mirror moves more slowly, and a new mechanism dampens its movement to reduce the noise. The end result isn't totally silent, but it's much quieter than in normal shooting mode, and it's far less likely to spook wildlife. We found it could be used next to a sleeping baby without waking it.

Unlike most quiet modes, which only allow single images to be taken, the 5D Mark III's allows a sequence of images to be taken, with a maximum continuous shooting rate of three frames per second.

contrast situations and the white balance and Picture Styles deliver the colour and tones that we have come to expect from a top-end Canon. The HDR system is also the best around.

Raw and JPEG image quality throughout the native sensitivity range is excellent, noise is well controlled and there's plenty of detail. The AF system has been given a serious upgrade from the Mark II, and it puts in an excellent performance. For this test, it did a good job of keeping up with skateboarders and BMX riders photographed in subdued light.

So, a great camera, and much more tempting now that prices have fallen since its launch. 📷

## Digital Camera

### FEATURES



### IMAGE QUALITY



### BUILD QUALITY



### VALUE



## Overall ★★★★★

**WE SAY:** The 5D Mark III delivers on many fronts, delivering high quality images in a wide range of situations. It may not have class-leading resolution, but it's a versatile full-frame camera and a delight to use.





**SLR** Price (RRP): EOS 5DS £3,000; EOS 5DS R £3,200 (bodies only) Available: June 2015 Web: [www.canon.co.uk](http://www.canon.co.uk)

# Introducing the Canon EOS 5DS...

Canon's 50Mp 5DS redefines the pro SLR market with a sensor matching the power of medium-format cameras

**T**he EOS 5DS and EOS 5DS R smash the full-frame D-SLR resolution record previously set by the Nikon D800/810. Canon's new full-frame sensor offers a resolution of 50.6 million pixels (aka megapixels). That's 40% more than the Nikon D800, a camera that caused jaws to drop on its own launch, just three years ago. To put it into perspective, the 50Mp sensor of the new 5DS matches the pixel count of the studio professional's medium-format Hasselblad H5D-50c 'digital

back' – a camera that will set you back a cool £22,440! It's possible the 5DS will capture better fine-quality images than a medium-format camera, as the pixels will be smaller on the full-frame sensor.

Comparisons with Canon's own EOS D-SLRs are even more stark. The EOS 5D Mark III was previously Canon's highest resolution D-SLR, with 22 million pixels – but the 5DS more than doubles this at a stroke. It also makes the professional top-of-tree 1D X look like a baby with its modest 18-megapixel full-frame

**Above** Like the 5D Mark III, the 5DS has a sensor that's the same size as a 35mm film frame

sensor. To put it another way, you could put the 1D X and 5D Mk III together and still come up 10Mp short of the 5DS's 50Mp power.

But who really needs a 50Mp digital camera? This kind of resolution might be overkill for the average amateur photographer, but for professionals it could be crucial. It could even take away the need to move up to the much more expensive world of medium-format digital photography, and with the 5DS's huge and incredibly detailed images, it will be particularly well-suited to



**Exposure:** 1/125 sec at f/4; ISO800  
**Lens:** EF 24-70mm f/4L IS USM

landscape, architecture, fashion and portrait photography. It provides the kind of resolution needed for large-scale displays like advertising billboards or posters.

While professionals are clearly the main target, Canon also talks about 'personal' photography. The EOS 5DS isn't exactly cheap, but it's not unattainable either. It goes on sale from June 2015 at £3,000, which equals the EOS 5D Mark III's RRP when it was released back in 2012 – it's now available for around £2,299. And the 5DS is still much less than Canon's flagship EOS-1D X model, which was £5,299 back in 2012 when it was launched – and is now available for around £4,845.

Sales of the Nikon D800/D810 have shown that there are plenty of committed enthusiast photographers out there who are prepared to spend serious amounts of money to get the best possible quality.

The 5DS R is sharper still

Canon has also followed Nikon's lead by releasing the EOS 5DS R – the 5DS is the 'regular' version with a low

**Above The** 50-megapixel sensor is able to capture incredible fine-detail

**Below The 5DS** sensor packs in more than twice the pixels of its 5D Mk III predecessor

pass filter, while the 5D R has the low pass effect removed. When Nikon launched the D800 in 2012, it also announced the D800E. Until that point, all D-SLRs had an optical 'low-pass' filter in front of the sensor to prevent moiré (interference) effects with fine patterns and textures. This slightly softens some of the fine detail as a side-effect, and the D800E had the low pass filter effect removed (reduced actually – it was removed entirely for the D810).

Canon hasn't simply taken the low pass filter out of the 5DS R,



incidentally, since this would have shifted the sensor's focal plane and required an internal redesign. Instead, the 5DS R has a second optical low pass filter to counteract the effect of the one that's already there. The 5DS R will, in theory, provide slightly sharper ultra-fine detail, but with the possible risk of moiré effects with some subjects. Canon says it should be fine, however, for subjects with 'organic' detail, like landscapes.

You might be cynical about the 5DS R. Isn't the 5DS 50Mp sensor sharp enough? Who needs images that much sharper? However, the Nikon D800E proved surprisingly popular – people wanted that extra ounce of resolution, whatever the risk. As it turned out, nobody reported any moiré problems when shooting stills, so it'll be interesting to see which of these two 5DS variants proves the most popular.

The Canon 5DS R goes on sale at the same time as the regular 5DS in June 2015, with a slightly increased price tag of £3200.

## WHERE IT FITS IN

It's interesting that Canon has chosen to put its new sensor in the 5D body, not the 1D line. Again, there's a parallel with Nikon's approach. The Nikon D800/D810 is cheaper than the flagship D4s, but the D4s designed specifically for high-speed/low-light sports and press photography. Canon's in the same boat with the 1D X; that's the specialised and expensive high-speed model, whereas the 5D has always been the more 'affordable' and smaller pro-level camera.

## Canon EOS 5D timeline

The 5D line has been with us for a decade now; here are the major specs for each 5D incarnation...



**EOS 5D 2005**

12.8-megapixel sensor • DIGIC II processor • ISO50-3200 • 9 AF points • 2.5-inch LCD • 3fps • CF memory card



**EOS 5D Mk II 2008**

21.1-megapixel sensor • DIGIC 4 processor • ISO 50-25,600 • 9 AF points • 3-inch LCD • 3.9fps • Live View • HD 1080p video • CF memory card



**EOS 5D Mk III 2012**

22.3-megapixel sensor • DIGIC 5+ processor • ISO 50-102,400 • 61 AF points • 3.2-inch LCD • 6fps • Live View • HD 1080p video • CF and SD memory card



**EOS 5DS 2015**

50.6-megapixel sensor • DIGIC 6 processor x2 • ISO 50-12,800 • 61 AF points • 3.2-inch LCD • 5fps • Live View • HD 1080p video • CF and SD memory card



Exposure: 1/125 sec at f/8; ISO100  
Lens: Canon EF 70-200mm f/2.8L IS II USM



**100% ZOOM**

The huge high-resolution 8688x5792-pixel images need to be seen on screen to be believed – viewed at 100% they reveal macro-like close-up detail



❶ In fact, apart from the higher-resolution sensor and some external details, the 5DS is practically the same as the excellent 5D Mark III. The 5D Mark III will continue alongside the new models too, and not just as a cheaper but outdated predecessor – it's better at managing higher ISO settings in low light, for a start. Understandably, as the 5DS has a more pixels, these pixels need to be smaller to fit onto the full-frame sensor, so in turn will be more susceptible to noise at high ISO settings. Therefore the 5DS has a maximum unexpanded ISO of 6400, but the 5D Mark III goes two stops better to ISO25,600. The 5D Mark III is better suited to movies, too, because for the 5DS, Canon has dropped the headphone socket for monitoring audio levels in favour of a USB 3.0 port for faster file transfer.



Exposure: 1/15 sec at f/11; ISO400  
Lens: Canon EF 24-70mm f/2.8L II USM

The mode dial rotates through 360 degrees and the icons are embossed

The 5DS R variant removes the low-pass filter effect for even sharper detail in images



In addition to 1.3x and 1.6x crop modes, three different aspect ratios are on offer; 1:1, 4:3 and 16:9 for more creative compositions

### KEY SPECS

The EOS 5DS packs dual DIGIC 6 processors (like the speedy 7D Mk II) to handle those massive 50-megapixel files, and this helps give it an impressive 5fps continuous shooting speed. There are plenty of faster cameras than this, but 5fps is enough for most jobs and a real technical achievement given the sheer quantity of data being captured by the sensor.

You don't always have to shooting using the 50Mp 8688x5792-pixel images, as the 5DS offers a 1.3x crop mode to simulate the sensor size of the older EOS 1D-series cameras, and a 1.6x crop mode to simulate Canon's smaller APS-C consumer models.

These still produce 30-megapixel

(6768x4512-pixel) and 19-megapixel (5424x3616) images respectively, so you'll still get plenty of detail – but the 1.6x crop mode does NOT mean that the EOS 5DS is compatible with EF-S format lenses. There are physical differences that makes this impossible, and the crop mode is simply there to simulate the smaller sensor sizes.

This is more useful than it might sound. You may be used to the 'reach' your 70-300mm telephoto gives you on your APS-C Canon, and now you can get the same effective magnification on the 5DS. You'll also get much more manageable file sizes – 50Mp is brilliant, but you won't necessarily need it all the time (when shooting JPEG, at least; with Raw files the full sensor data is still captured). Within the same crop menu, there are also three 'aspect ratio' modes for more creative compositions; 1:1, 4:3 and panoramic 16:9.

### HIGH-TECH AF

The 5DS uses the same high-tech autofocus system as the EOS 5D Mark III, with 61 AF points including 41 cross-type sensors and five dual cross-type. It's fast and powerful, though the AF customisation options can leave your head reeling. But the myriad AI Servo AF 'Case' settings are there if you need to fine-tune how the 5DS focuses on moving subjects.

It uses Canon's 'Intelligent Tracking and Recognition AF' (iTR) to



The two variants are identical aside from the 5DS R's low pass cancellation filter



track both faces and colour. The 150,000 pixel RG+IR light metering sensor also has the Flicker Detection first seen on the EOS 7D Mark II for more reliable exposures under artificial light (notably fluorescent light). We feel this is the best metering system Canon has produced so we're pleased to see the 5DS is equally well equipped too.

The Canon 5DS also has a new Fine Detail picture style that is designed to offer advanced sharpness adjustment without the need for a computer, to help you get the very best out of the 5DS.

### KEEP IT SHARP

With the 5DS, Canon has introduced a new Mirror Vibration Control System, which uses cams to drive the camera's mirror up and down in a controlled fashion, avoiding sudden stops that could jar the camera and blur the picture. This highlights a key point with the 5DS – the resolution is so high that small camera movements or focus errors that would go unnoticed in other cameras can start to become visible. The 5DS will

Externally the EOS 5DS and 5D Mark III look identical, but internally it's a different story

never record less detail than a camera with a lower resolution sensor, but you will need to take more care over focusing and camera shake to really see its full potential.

Of course, this also means handling bigger image files, likely to be around 50-60MB each. So you'll also need to think seriously about getting some bigger, faster memory cards (it takes both CF and SD) and a bigger hard disk for your computer (or maybe a newer, faster computer) to handle those 50-megapixel files.

### THE BODY BEAUTIFUL

The EOS 5DS is actually based on the existing EOS 5D Mark III. In fact, if it weren't for the logos on the new camera, you might find it pretty hard

to tell them apart. But that's OK, because the 5D Mark III has proved itself an extremely capable, versatile and robust camera for professional stills and video photography, but at a price that won't require you to remortgage. That Canon chose the 5D product line for its new 50-megapixel sensor rather than a top-of-the-range EOS-1D X refresh is good news for consumers too, because it keeps the price down to a level that could tempt well-heeled amateurs, not just professionals. We are often surprised by how many enthusiast readers use top-of-the-range Canon D-SLRs.

### SIZE AND WEIGHT

The 5DS is bigger and thicker than the average consumer D-SLR, but not by as much as you might expect. Serious pro cameras, like the 1D X, have big, fat battery packs integrated into the base of their body, which makes them both taller and heavier, but the 5DS uses a regular LP-E6 battery – the same as the 5D Mark III – which slides up into the grip in the normal way.

Interestingly, this doesn't give you as many shots with the 5DS – just 700 shots rather than the 950 shots you get from the 5D Mark III. This suggests that the 5DS's 50-megapixel sensor and twin DIGIC 6 processors are gobbling up a good deal more power. But even though the 5DS is comparatively compact (for a pro D-SLR), it feels solid as a rock – just like the 5D Mark III. On the inside there's a magnesium alloy chassis, and on the outside a hard-wearing matt finish that's also easy to grip.



One clever new feature is a customisable Quick Control screen, which enables you to set up the 5DS so you can easily access the controls you use most often via the LCD and Q button

It's even possible to customise the quick control screen to give quick access your favourite settings

Canon says (without the LP-E6 battery) the 5DS weighs 845g, compared to the 5D Mk III at 860g.

### STILL IN CONTROL

The 5DS uses the same control layout as the 5D Mark III, and it's going to be familiar to anyone who's used Canon's high-end D-SLRs before. A trio of dual-function buttons on the top control six key camera functions – metering pattern, white balance, AF mode, drive mode, ISO and flash compensation – in the simplest way possible. You press the button and turn either the front dial or the rear dial, depending on which one of the two settings you want to alter.

For those not familiar with 5D bodies, the front dial is on top just behind the shutter release. It's not that big, but you can find it straight away with your index finger, and it has the perfect firm, click-stop feel. The rear dial is a large, circular 'dish' that you spin with your thumb. But forget all of those lightweight and hard-to-use combined four-way controllers and dials you get on smaller cameras. This has no secondary functions or shortcuts you can click accidentally – it's just a control dial, plain and simple, and it does the job brilliantly.

Just above this is a small 'thumbstick' used for navigating menus and other on-screen options. This has a slightly vague feel, but it works perfectly well.

Between them is a 'Q' button, which activates the Quick Control screen – and on the 5DS it's now possible to customise the Quick Control screen to have your own favourite settings within easy reach on the LCD. We didn't have time to explore this properly, but it looks like it could be a really useful option for photographers who use their cameras in their own way and who need to make frequent setting changes.

The 5DS also has the same large, crystal-clear 3.2in LCD for reviewing

## Tech specs Canon 5DS v Canon 5D Mk III



Canon EOS 5DS/5DS R



Canon EOS 5D Mk III

Megapixels	50.6Mp full-frame CMOS sensor	22.3Mp full-frame CMOS sensor
Image processor	Dual Digic 6	Digic 5+
AF points	61 (41 cross-type; 5 dual cross-type)	61 (41 cross-type; 5 dual cross-type)
ISO range	100-6400 (expandable to 50-12,800)	100-25,600 (expandable to 50-102,400)
Image sizes	8688 x 5792 Raw/Large JPEG 6480 x 4320 M-Raw 4320 x 2880 S-Raw 6768 x 4512 1.3x Crop JPEG 5424 x 3616 1.6x Crop JPEG 5792 x 5792 1:1 Crop JPEG	5760 x 3840 Raw/Large JPEG 3960 x 2640 M-Raw 3840 x 2560 M JPEG 2880 x 1920 S-Raw/SI-JPEG 1920 x 1280 S2-JPEG 720 x 480 S3-JPEG
Low-pass filter	Built-in fixed/disabled (5DS R)	Built-in fixed
Metering zones	252	63
HD video	Full HD 1080p at 30, 25, 24fps	Full HD 1080p at 30, 25, 24fps
Viewfinder	100% coverage, 0.71x magnification	98% coverage, 0.71x magnification
LCD size	3.2-inch 1,040K dots	3.2-inch 1,040K dots
LCD Live View	Yes	Yes
Continuous shooting	5fps	6fps
Max burst	510 JPEGs or 14 Raw files	16270 JPEGs or 18 Raw files
Top LCD/rear dial	Yes	Yes
Interface	USB 3.0, HDMI, External microphone	USB 2.0, HDMI, Headphone mini jack, External microphone
Custom functions	16	13
Weight (body with battery)	845g	860g
Price (body only)	£3,000 RRP (5DS) £3,200 RRP (5DS R)	£2,299 street price

images and shooting using Live View (although in common with other top-end EOSs, this is neither touchscreen nor swivelling). If you currently use a 5D Mark III (and probably any other high-end Canon D-SLR) you could pick up the 5DS and start using it straight away because all the controls are exactly where you're used to finding them.

### QUIET PLEASE

The EOS 5D Mark III is quiet for a full-frame camera, but the new mirror control system in the 5DS makes it quieter still.

As we've said, the 5DS can't match the 6fps frame rate of the 5D Mark III, but 5fps is still really impressive given the huge file sizes that a 50Mp generates. 📸

## Early verdict

The 5DS is almost identical, externally, to the 5D Mark III, and that's a real plus point – it's a solid, neat design with really well-thought-out controls, and all of this has been retained in the 5DS.

You lose the headphone monitoring socket, so it's not as good for video, but Canon says the 5D Mark III will continue

alongside, so videographers can carry on using that instead.

But the 5DS, of course, adds that incredible 50-megapixel sensor with more than double the resolution – wow! The EOS 5DS and 5DS R aren't out until June, but we can't wait to test one properly, and we'll bring you a full verdict as soon as we can.



## &gt; THE SPECS

<b>Sensor</b>	16.5 million pixel CMOS APS-C sized sensor (23.6x15.7mm)
<b>Focal length conversion</b>	1.5x
<b>Memory</b>	Internal 16GB, plus SD/SDXC/SDHC slot
<b>Viewfinder</b>	None (available as option)
<b>Video</b>	1080p
<b>ISO range</b>	100-12,500
<b>Autofocus points</b>	11
<b>Max burst rate</b>	5fps
<b>Screen</b>	3.7 inch TFT LCD, 1.3 million pixels
<b>Shutter speeds</b>	1/4,000-30 sec
<b>Weight</b>	384g (including battery)
<b>Dimensions</b>	134x69x33mm
<b>Power supply</b>	Leica BP-DC 13 lithium-ion battery (rechargeable)



While compact system cameras have become pretty commonplace over the past couple of years, Leica through its series of rangefinders has arguably been in the CSC market for longer than anybody else. Now, however, it has introduced the T, which will compete more directly with the likes of the Fujifilm X series, the Olympus PEN and OM-D ranges and the Sony E-mount systems.

Leica says that the T system is a return to “back-to-basics shooting”, a claim that is borne out by the fact that there aren’t very many complicated controls on the body of the camera itself.

## FEATURES

Inside the T is a 16.5 million-pixel APS-C sized sensor, which puts it in direct competition with cameras from Sony, Samsung, Canon and Fujifilm. Leica has also developed a new image processing engine for the T series.

The Leica T mount is brand-new. There are currently just two new lenses that are directly compatible: an 18-56mm f/3.5-5.6 lens



**CSC** Leica T > £1,350 / \$1,850 (body only) > [www.leica-camera.com](http://www.leica-camera.com)

# Crafted machine

Leica’s first mainstream CSC will set you back a pretty penny, but is it worth the outlay? **Amy Davies** has a look...

(£1,240/\$1,750) and a 23mm f/2 prime optic (£1,340/\$1,950). Unlike with Leica’s M rangefinder lenses, T lenses are capable of autofocus. You can attach classic lenses via an adaptor – although these optics remain Manual Focus only.

Leica is promising to introduce two more lenses for the T system during September’s Photokina, the huge



Above The Leica T features an APS-C sized sensor

biennial photo industry fair. Look out for a wide-angle 11-23mm f/3.5-4.5 and a telephoto 55-130mm f/3.5-4.5.

Leica is positioning this camera more towards the luxury end of the market, so design is a key selling point. The body has been designed in collaboration with car manufacturer Audi and is crafted from a single block of aluminium.

Interestingly, the company hasn’t skimped on modern features. There’s integrated Wi-Fi, which allows for the quick transfer of images across to your smartphone, tablet or computer, or for those devices to be used as a remote viewfinder. There’s also a 3.7-inch touchscreen on the back of the camera – much larger than the displays on most CSCs. No viewfinder is included, but an optional model can be attached via the hotshoe.

## BUILD AND HANDLING

At 134x69x33mm, the T is a fair bit

## Meet the rivals...

See how the Leica T stands up against the competition

**Sony Alpha 5000**

£350 / \$500  
(with 16-50mm lens)

A high-performing model from Sony – a good first system camera with plenty of control and small size.  
**Not reviewed**

**Fujifilm X-M1**

£410 / \$600  
(with 16-50mm lens)

The X-M1’s image quality is great. It’s nice to see Fujifilm thinking mass-market.  
**Reviewed: issue 145**  
★★★★☆

**Samsung NX300**

£410 (with 20-50mm lens) / \$719 (with 18-55mm lens)

Great image quality inside an attractive body.  
**Reviewed: issue 143**  
★★★★☆



smaller than other Leica models. It's reasonably similar in size and shape to the Panasonic GX7, for example. But it's quite a heavy camera, and having been crafted from a single piece of aluminium, it feels pretty solidly built too.

Probably the most notable thing about the T's design is the scarcity of buttons on the body compared with the plethora most modern cameras offer. Most of the rear is taken up with the LCD screen. While there is some space here where additional buttons could have been added, this would no doubt have distracted from the sleek appearance of the camera.

There are two dials on the top of the camera, which control different parameters depending on the shooting mode you're in. The left dial can be customised. For instance, if you're in Aperture Priority mode, the right dial will control aperture, and you could set the left to adjust sensitivity or

exposure compensation.

Also on the top of the camera, you'll find an on/off switch, a dedicated video record button and the shutter release. If you move the on/off switch past the 'on' position, the built-in flash will pop up. Aside from these few manual controls, though, you're completely reliant on the touchscreen for changing modes and settings.

A menu accessed by pressing a camera icon in the centre right of the screen brings can be customised to match your needs. As with the dials, this menu can be customised to your preferred way of working, with a simple hold-and-swipe gesture replacing and re-ordering the functions as desired. Entering

**"The body has been designed with Audi and is crafted from a single block of aluminium"**

**WHAT'S THIS?**  
Find out how we test on page 6

**CSC TEST**

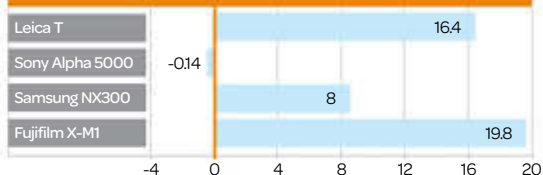
LECIA T

41

## CAMERA BENCHMARKS

How does the Leica T measure up?

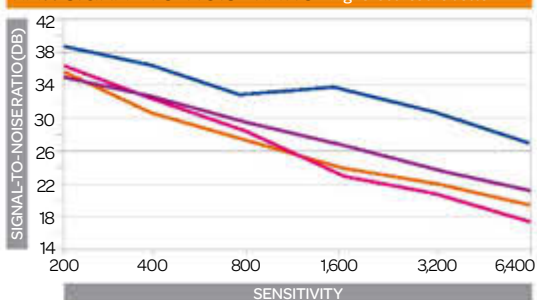
### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** The Sony A5000 is the most accurate camera on test. The T's results suggesting warm, pleasing tones.

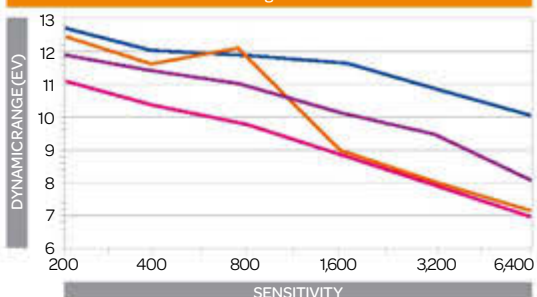


### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The T has a mixed performance at lower sensitivities, but fares better higher up the range. The X-M1 triumphs throughout.

### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** Again, it is the Fujifilm which comes out on top, with the Leica T performing similarly to the other cameras on test.

### OVERALL BENCHMARK RESULT

At lower sensitivities, the Leica T performs similarly to other cameras on test, but at the higher end of the scale, it achieves a middling result, beating some but not all models. Given the price premium you're asked to pay, it's disappointing not to see a better performance.

\* Raw results use images converted to TIFF

**Above left Colours are generally rendered well**

playback requires a swipe down from the top of the screen, or a swipe up from the bottom – which is quite a nice touch.

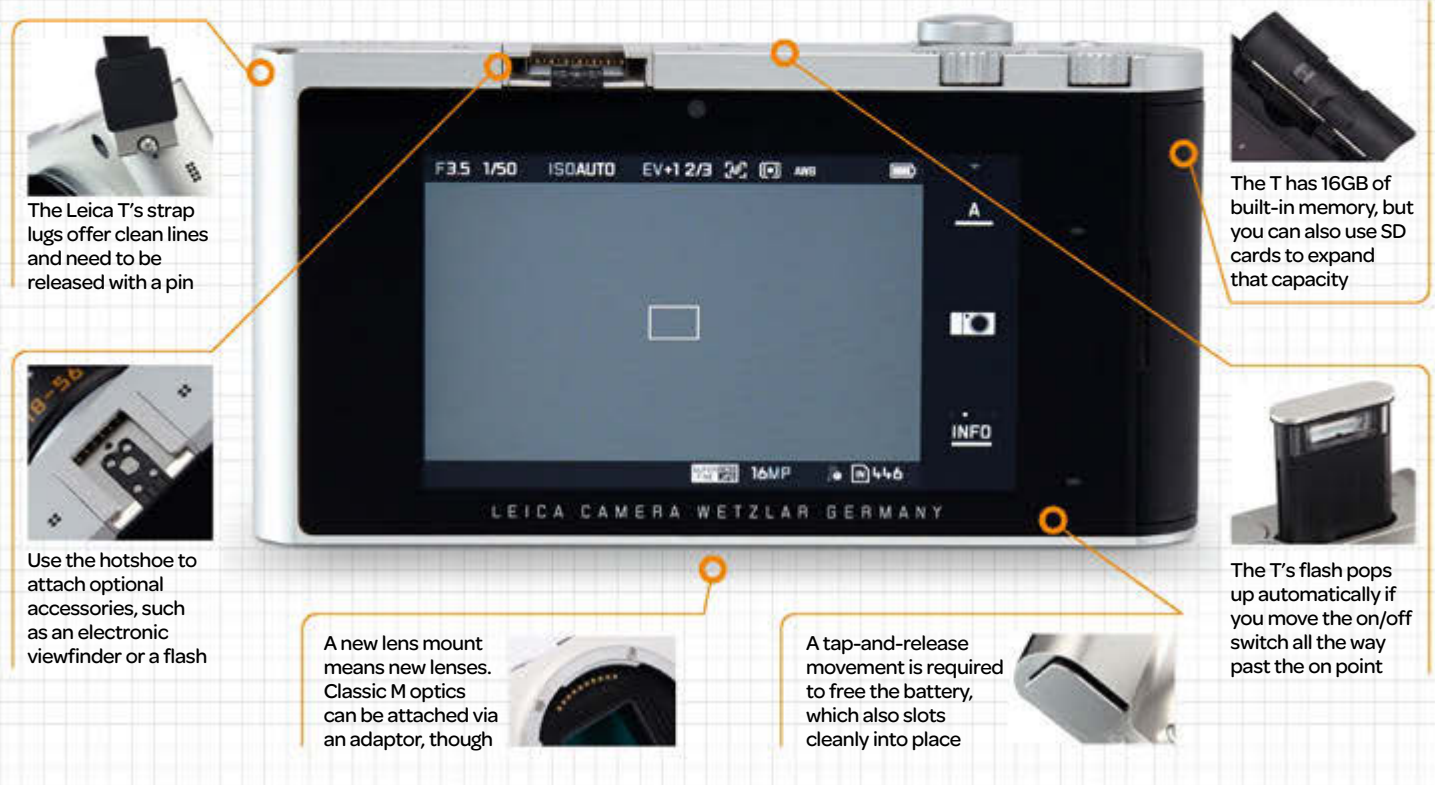
### PERFORMANCE

With a premium price tag and the weight of the Leica brand behind it, expectations for the T were pretty high. Sadly, these haven't quite been met. While the image quality is good, it's really only competitive with what is already available on the market for



## Zooming in on the... Leica T

A quick tour of the camera's key features



❏ a much cheaper price. Most of the time, colours are rendered pretty well, but there are occasions where skies in JPEG images are overly cyan when compared with the raw (DNG) images.

**“The automatic white balance system does an excellent job of reproducing accurate colours”**

If you're OK to work with raw files, this isn't a huge problem, but it's a little bit disappointing to see.

The T's metering system does a decent job of producing accurate exposures. It has a slight tendency to underexpose, so you'll need some positive exposure compensation in some circumstances. The automatic white balance system does an excellent job of reproducing accurate colours, even when the camera is faced with an artificial lighting source.

Autofocussing speeds – and, indeed, general operating

speeds – are certainly not the fastest on the market. In good light, the T will generally lock onto the subject with ease, but it has to work harder in lower light. Shot-to-shot times are a little sluggish, with a few seconds' gap between each shot.

While the T may open up the traditionally premium Leica brand up to a wider audience, you're paying over the odds for the famous red dot. Image quality is good, but no better than equivalent competing cameras, and the overall T system is still quite limited until Leica has the chance to develop it. 📷

Digital Camera	
FEATURES	BUILD QUALITY
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** Image quality from the T is no better than its equivalent rivals from Sony, Fujifilm or Samsung. If design, aesthetics and that famous red dot are your thing, though, this might just be your bag.



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## &gt; THE SPECS

Sensor	18.4MP CX-format CMOS sensor (13.2 x 8.8mm)
Focal length conversion	2.7x
Memory	MicroSD /SDXC /SDHC
Viewfinder	N/A
Video	Full HD (1,920 x 1,080p) at 30 frames per second
ISO range	160 to 12,800
Autofocus points	171 focus areas (central 105 areas, phase detection)
Max burst rate	60 frames per second
Screen	Three-inch, 1,037k-dot TFT LCD touchscreen
Shutter speeds	1/16,000-30 seconds, Bulb
Weight	232g (body only, with battery and memory card)
Dimensions	99 x 60 x 28mm
Power supply	Li-ion EN-EL22 battery (rechargeable, supplied)



CSC Nikon 1 J4 &gt; With 10-30mm lens: £489 / \$596 &gt; www.nikon.com

# Fast shooter

The small J4 has many of the features of Nikon's more expensive V3. **Amy Davies** finds out if the image quality is as good

**A**nnounced roughly a year after the J3 made its debut, the J4 features the same 18.4-million pixel CX format (one-inch) sensor and Hybrid AF (autofocus) system as the V3. This means it doesn't have an anti-aliasing filter, for better detail resolution, and its 171 focus areas are said to help lock onto subjects quickly.

## KEY FEATURES

Along with the sensor, the J4 shares the same image processor as the V3 and, like the V3, it doesn't have an electronic viewfinder (EVF). With the J4, however, there's no hotshoe mount for attaching additional accessories, although there is a built-in flash.

While the rear screen doesn't tilt as it does on the V3, it is touch-sensitive, which is useful for adjusting settings and changing the AF point.

Other useful and interesting features include integrated Wi-Fi, full HD video recording and a Creative Palette, which enables you to see effects as you shoot.

It's also possible up to shoot at up to 60 frames per second (fps).

## BUILD AND HANDLING

The J4 is much more compact than the V3. Despite the lack of a finger grip, it still sits nicely in the hand.

Up top is a fairly minimalist mode dial, which doesn't feature all of the exposure modes on offer – Aperture



Above The J4 includes a small pop-up flash, but no hotshoe.

Priority is just a sub-set of the Creative mode, for instance. As there's a touchscreen only a few buttons are required on the camera's back.

A dial encircling the four-way navigation pad controls different shooting elements depending on what shooting mode you're in – in Aperture Priority, for example, it can control aperture.

To change the most commonly used settings, tap the F button to access the Quick menu – from here, white balance, metering, Picture Control etc can be adjusted.

You can also use the touchscreen to set the AF point, or if you prefer, to have the camera focus and trigger the shutter release – useful when shooting from tight angles.

## PERFORMANCE

The J4's image quality is much on a par with that of its sibling, the V3. Straight from the camera, JPEGs

## Meet the rivals...

How does the Nikon 1 J4 fare against its closest competitors?



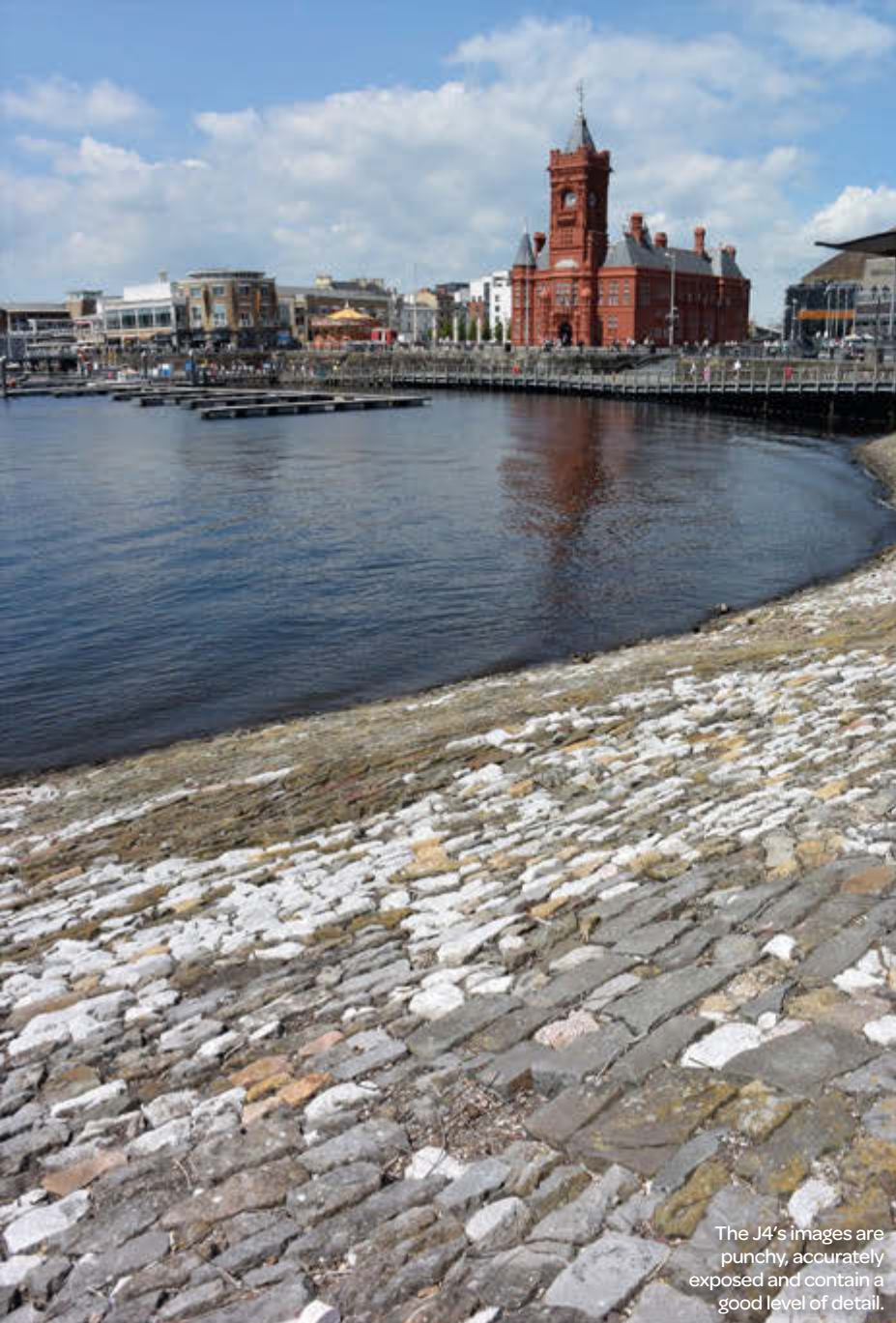
**Samsung NX mini**  
£349 / \$449  
(with 9mm lens)  
An interesting camera offering reasonable value for money.  
Reviewed: page 92  
★★★★★



**Panasonic GM1**  
£535 / \$749  
(with 12-32mm lens)  
This small CSC still manages to fit in a good, large image sensor.  
Reviewed: page 72  
★★★★★



**Olympus E-PM2**  
£338  
(with 14-42mm lens)  
The OM-D sensor makes this small CSC a terrific little purchase.  
Reviewed: issue 136  
★★★★★



The J4's images are punchy, accurately exposed and contain a good level of detail.

are bright and punchy and contain a decent level of detail – especially for a camera with a one-inch sensor. However, it can't compete that closely with cameras featuring larger sensors.

Imager noise levels are good throughout the sensitivity range, but at 100 per cent you can see some loss of detail at ISO 800. That loss increases at ISO 3,200, but it shouldn't be a problem unless you're printing at large sizes. If you favour detail over noise reduction, shooting in raw format allows you to add your own reduction post-capture.

The camera's metering system does a decent job of producing accurate exposures, while the automatic white balance system copes well with artificial lighting to produce accurate colours in the majority of shooting situations.

Autofocusing is very quick unless light levels drop significantly, but that's to be expected.

## VERDICT

The J4 is a good, mid-range compact system camera that will particularly appeal to existing Nikon shooters. It's easy to use, and the addition of a touchscreen speeds up some processes, such as setting the AF point. Images are good, but the J4 can't compete too favourably with CSCs boasting larger sensors.

Digital Camera	
FEATURES	BUILD QUALITY
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** While the J4 isn't exactly the most exciting introduction of 2014, it's a decent performer. If you're not brand-loyal, look at some of the other small CSCs on the market – especially the Panasonic GM1.

# CSC TEST

NIKON 1 J4

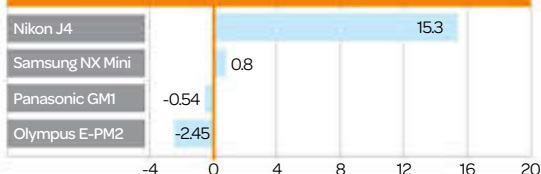


**WHAT'S THIS?**  
Find out how we test on page 6

## CAMERA BENCHMARKS

How does the Nikon 1 J4 measure up?

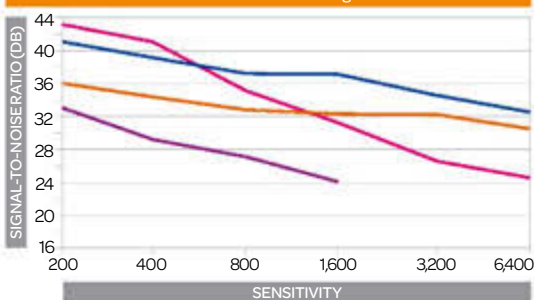
### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** The J4 is the least accurate performer on the test, which highlights its tendency towards pleasing, warm tones.

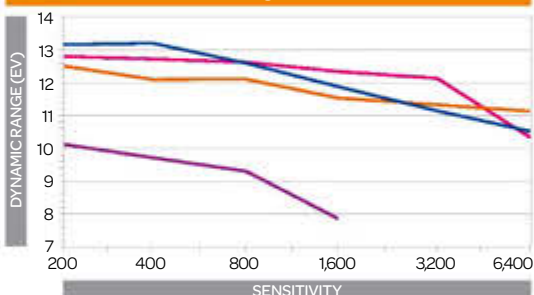
KEY	Nikon J4	Samsung NX Mini
	Panasonic GM1	Olympus E-PM2

### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The J4 is beaten by all the cameras on the test, while the Panasonic GM1, with its larger sensor, comes out on top.

### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** Again the J4 puts in the weakest performance, but this time it is the Olympus E-PM2 which fares the best.

### OVERALL BENCHMARK RESULT

Although the J4 puts in a decent all-round performance, it is beaten by the other cameras in this test – even the Samsung NX mini, which has the same-size sensor. JPEGs fare slightly better for signal-to-noise ratio than their raw counterparts, but this could be as a result of loss of detail.

\* Raw results use images converted to TIFF



## &gt; THE SPECS

Sensor	24.2 million pixel APS-C sensor
Focal length conversion	1.5x
Memory	SD/SDHC/SDXC
Viewfinder	Optical viewfinder with 95% coverage, 0.85x magnification
Video resolution	Full HD (1,920x1,080)
ISO range	ISO 100-12,800 (expandable to 25,600)
Autofocus points	11
Max burst rate	5fps
LCD screen size	3-inch, 921,000 dots
Shutter speeds	1/4,000-30 seconds
Weight	460g (including battery and memory card)
Dimensions	124x98x75.5mm
Power supply	EN-EL14a Li-Ion battery



cameras at the bottom of Nikon's range always spring to mind as recommendations for beginner photographers.

The Nikon D3200 was an excellent performer, and its replacement the D3300 promises to deliver a camera of a similarly high standard.

In common with other camera manufacturers, Nikon tends to incorporate elements of technology from its more advanced models in its starter range. The D3300 looks set to be another good choice for beginners. It offers the same 24.2 million-pixel count as the D3200, but it lacks the optical low-pass filter over the sensor and should therefore capture sharper, more detailed images.

Removing the anti-aliasing filter is something we've seen mainly on professional and enthusiast level cameras so far. A potential downside to removing AA is that it increases the chance of moiré patterning appearing on some images – usually when you photograph something with repeating or close patterns.

Enthusiasts and professionals don't usually have a problem removing such patterning afterwards in post-processing, but it's rather interesting that Nikon should choose this design for an entry-level model, whose owners are less likely to use image-editing software to perform such a task.

Nikon claims that the high pixel count found on the D3300 almost eliminates the risk of the patterning occurring. We'll be keen to find out how true that is.

Along with the sensor redesign, Nikon has also improved the user interface and the Guide mode, to give



SLR Nikon D3300 > £430 (body only)

> [www.nikon.co.uk](http://www.nikon.co.uk)



# Star starter SLR

Nikon's new D3300 has a great deal to offer anyone who's shopping for their first SLR, as **Amy Davies** discovers

it more functionality and make it a little cleaner in appearance.

## FEATURES

Like the Nikon D5300, the new D3300 has the manufacturer's latest-generation Expeed 4 engine. This allows the new camera to shoot up to 100 fine-quality JPEGs continuously at a maximum rate of 5fps. In addition, the native sensitivity range runs from ISO 100 to 12,800 and there's an expansion setting that takes it to the equivalent of ISO 25,600.

Also like the D5300, the D3300 has an Effects mode that allows a collection of styles to be applied to JPEG images and video. These include Pop and Toy Camera, while there's an Easy Panorama mode too.

The D3300 also has a dedicated 420-pixel RGB sensor to gather exposure, white balance and focus information for the Automatic Scene Recognition system.

**Above** The D3300 boasts many updated features

Although the D3300 uses the same battery as the D3200, Nikon claims that the new processing engine allows it to be more efficient in its power consumption, meaning that the battery life can last for around 700 shots.

## BUILD AND HANDLING

Nikon has slightly reduced the size of the camera compared with the D3200, but placing the two side by side doesn't reveal too dramatic a difference. The grip is still deep and comfortable to hold, with the textured grip making it feel particularly secure in the hand.

The D3300 has a pleasingly modern appearance. The high-res screen gives the display beautifully rounded edges and shows the interface's colours well. When shooting, the camera displays three circles to represent shutter speed, aperture and sensitivity (ISO). These displays change as you adjust settings

## Zooming in on the... Nikon D3300

A quick tour of the camera's key features



Toy Camera and Panorama shooting are under the Effects mode.



With up to 700 shots per charge, the D3300 is fantastic for holidays.



Options are controlled via the screen, but it's not touch-sensitive.



You need to switch the timer on every single time you want to use it.

◀ FEELING TREATED



The D3300's viewfinder only offers a 95% field of view, so you'll need to bear that in mind when composing shots.



You can press the i button to access a quick menu for the most commonly-used settings, such as white balance.



Use this scrolling dial to alter aperture or shutter speed, depending on the mode you're shooting in.



Instantly access the camera's Live View shooting mode by hitting this button.



using the scrolling dial or buttons; the most obvious is the aperture circle, which closes and opens to represent the aperture blades adjusting.

A dial on the back of the camera is used for altering the aperture or shutter speed, depending on the mode you're shooting in. When in Manual mode, and needing to control both functions, you'll have to hold down the exposure compensation button while scrolling the dial to switch between the two parameters.

There aren't a huge number of buttons on the D3300, which is unsurprising for an entry-level

**"There's a function button near the lens mount, which allows you by default to change the ISO"**

camera. On the top plate you'll find a mode dial for switching between exposure modes, such as fully automatic, Aperture Priority and the newly-incorporated Effects mode. Also on the top plate you'll find the exposure compensation button (for use in automatic and semi-automatic modes) and an info button, which helpfully turns off the rear display,

preventing it from being a distraction while using the viewfinder.

A quick menu is accessed by pressing a button labelled 'i' on the back of the camera. After it has been pressed, use the directional keys to travel to a setting you want to change – such as white balance, then press OK to bring up the different options available to you. Unfortunately, this menu isn't customisable, so if there's something on this menu you rarely use, you're stuck with it.

There's also a function button near the lens mount, which allows you to quickly change the sensitivity. You can change it to a couple of other options if you prefer, but the choice isn't huge – which again is a shame.

Changing the AF point is simple. All you need to do is press the directional keys to move around the point you need. As the central AF point is cross-type, it is more sensitive than the others, so you may find it beneficial to focus and recompose in certain situations, or if you're just aiming for speed.

The viewfinder is optical and offers a 95% field of view. While it is bright and clear, not being 100% means that

### Meet the rivals...

See how the D3300 stands up against the competition



**Canon EOS 100D**

£399 (body only)

The world's smallest digital SLR features an excellent sensor and is a great first swappable-lens camera.

Reviewed: page 18



**Nikon D3200**

£310 (body only)

You should be able to get good deals on the previous model, which is great for beginner photographers.

Reviewed: issue 127



**Fujifilm X-A1**

£379 (with 16-50mm lens)

An ideal first CSC with excellent image quality; its small size makes it perfect for those looking for something lightweight.

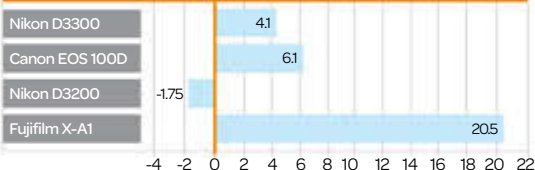
Not reviewed



## CSC BENCHMARKS

How does the Nikon D3300 measure up?

## COLOUR ERROR Closest to zero is best



**COLOUR ERROR RESULT:** JPEGs show good natural colour, though it's not a match for the Sony RX100's excellent colour reproduction.

**KEY** Nikon D3300 (purple), Canon EOS 100D (pink), Nikon D3200 (orange), Fujifilm X-A1 (blue)

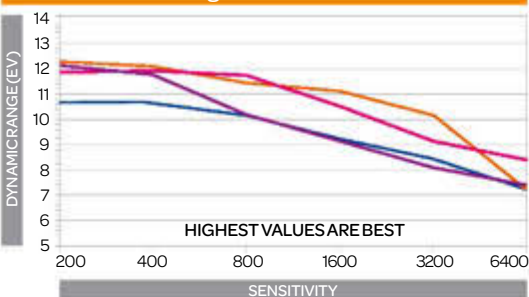
**WHAT'S THIS?**  
Find out how we test on page 6

## TIFF NOISE Highest values are best



**NOISE RESULT:** At face value the D3300 looks the worst performer. But this just shows it favours detail reproduction over noise reduction.

## TIFF DYNAMIC RANGE Highest values are best



**DYNAMIC RESULT:** Raw format files (after conversion to TIFF) show a consistent result, fairly closely matching the other cameras on test.

## OVERALL BENCHMARK RESULT

The D3300 performs similarly to the D3200 in some respects, especially in terms of dynamic range. It beats the Canon EOS 100D at the lower end of the scale before dropping below it from ISO 1,600 and above for JPEG files. The noise results show that the removal of the anti-aliasing filter has increased detail reproduction, which is favoured over noise reduction.

there is a chance of something appearing in the final image that you didn't notice in composition. Fortunately, with such a high pixel count, if you need to crop an image later, overall image quality shouldn't drop too much.

## PERFORMANCE

We were big fans of the both the D3200 and the D3100, so we had pretty high hopes that the D3300 would continue this impressive

**Above right** The new Effects mode gives you plenty of scope to get creative with your pictures while you're shooting

beginner line-up. Nikon entry-level cameras usually offer quite a lot for the cash, and the D3300 is no different in that respect.

The big difference between this camera and its predecessor is the removal of the anti-aliasing filter, which improves detail resolution. Zooming in to 100% reveals very fine details. Happily, we've not come across any examples of moiré patterning when shooting stills either, suggesting Nikon's claim that removing the filter presents less of a problem for high-pixel-count cameras is accurate.

With such a high pixel count (24 million), there comes the increased chance of noise appearing in images. Like the D3200, the D3300 handles low-light, high-sensitivity situations well. Noise only really starts to

become apparent when shooting at ISO 3,200 or above; even then it's acceptable, or certainly preferable to a blurred or missed shot.

In the majority of shooting conditions, all purpose metering does a good job of producing accurate exposures. The camera can get a little confused if you're shooting something with high contrast. Switching to spot metering, or dialling in some exposure compensation helps to reduce this if the camera is struggling.

Similarly, the white balance system is impressive, managing to produce accurate colours even while shooting indoors. Shooting under normal household artificial light produces images that are close to accurate, hardly erring towards warm tones at all, which is excellent to see in a





## Tech Briefing

### Retractable kit lens



**F**ighting a battle against compact system cameras means reducing the size of an SLR wherever possible. Probably the most noticeable reduction here is the new retractable 18-55mm kit lens, which comes packed with the D3300 as standard and offers a 30% reduction in size from the previous 18-55mm lens.

A mechanism allows for the lens to be retracted when not in use, but it does add the step of extending the lens before you can take your first shot. It also features a vibration reduction (VR) function, which means you can shoot up to four stops faster. The minimum focusing distance is just 0.25m (with manual focusing), making it useful for macro shooting.

beginner camera.

Autofocusing speeds are pretty quick, especially in daylight or well-lit conditions. It's rare for the kit lens to hunt around to acquire focus, and rarer still for it to present a false confirmation of focus. Speeds drop

**Above** The 18-55mm kit lens is a great all-round performer for your first lens

a little in lower-light conditions, but it's only when it's extremely dark that the lens struggles to focus at all.

It's worth bearing in mind that focusing speeds drop significantly when using Live View, so its use is only really recommended if you're shooting something stationary, or if you're shooting from an awkward angle and can't manage to compose using the viewfinder.

**Below** You can access the Effects mode straight from the dial

## VERDICT


Nikon continues to impress in this segment of the market. While the entry-level area may not seem like the most lucrative, hooking somebody at the beginning of a buying career is key to long-term sales, so it's no surprise to see companies such as Nikon pulling out all the stops.

You get a lot of seriously good kit for your money. For starters, there's the 24 million-pixel sensor, which, with its AA filter-less design is capable of producing more detail than the previous version of the camera, and gives you the bonus of being able to crop into the scene for extra reach.

Updating the user interface to give it a crisp and clean look is also a smart move, keeping the camera looking fresh. The Guide mode continues to be something that makes this camera appealing to novice users

— not having to dig out the manual or search online for help is especially useful when you're out shooting with the camera and get a little stuck.

It's a bit of a shame that this camera doesn't have built-in Wi-Fi, as this would probably have been more enticing to beginner users who are used to sharing their shots quickly from smartphones. There's also no touch or articulating screen. Although it's to be expected at this price point, it makes some of the entry-level compact system cameras that do offer this functionality look more appealing.

The D3300 will go head to head with the Canon EOS 1200D, which seems a little lacklustre next to Nikon's offering, although the 1200D is cheaper. 

Digital Camera	
FEATURES	BUILD/HANDLING
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** With its high resolution, the D3300 satisfies those who crave the megapixels without skimping on image quality. Just about the best beginner-level SLR on the market, this is an excellent buy.





## &gt; THE SPECS

<b>Sensor</b>	APS-C (DX) format (23.5x15.6mm) CMOS sensor with 24.2 million effective pixels
<b>Crop factor</b>	1.5x
<b>Memory</b>	SD/SDHC/SDXC
<b>Viewfinder</b>	Optical pentamirror type with 95% coverage
<b>Video resolution</b>	20x1080 at 60p/50p/30p/25p/24p
<b>ISO range</b>	100-25600
<b>Autofocus points</b>	39 (nine cross-type)
<b>Max burst rate</b>	5fps
<b>Buffer capacity</b>	Unconfirmed, but likely to be six 14-bit RAW files or 100 JPEGs
<b>LCD screen</b>	13.2-inch, 1,037,000-dot touch-sensitive LCD
<b>Shutter speeds</b>	1/4000 to 30 secs; Bulb; Time
<b>Weight</b>	420g (body only)
<b>Dimensions</b>	124x97x70mm
<b>Power supply</b>	Rechargeable EN-EL14a battery

SLR Nikon D5500 > £640, \$900 (body only) > [www.nikon.com](http://www.nikon.com)

# Nikon D5500

Most of the spec is familiar, but at last there's a Nikon SLR with a touchscreen. **Angela Nicholson** gives it a poke...

**Y**our first question on seeing the new Nikon D5500 may well be, "But what's new?" It takes a fairly careful look at the D5500's specification list to find the differences between it and the D5300. Both cameras have the same APS-C- (DX-) format sensor with 24.2 million effective pixels and no optical low-pass filter; an Expeed 4 processing engine; a 3.2-inch 1,037,000-dot LCD screen; Nikon's 39-point Multi-CAM 4800DX AF module; and Wi-Fi connectivity built in. The exposure metering systems and maximum continuous shooting are also the same.

The most significant difference between the two is that the screen on the D5500 is touch-sensitive, enabling you to make a range of adjustments by touching the LCD (see Touch Control, above right).

Nikon has kept the sensitivity range the same on the D5500 as it is on the D5300 (ISO100-25600), but the top three settings are now in the native range rather than expansion settings. Could this mean that Nikon has managed to improve image quality at the higher values? We're keen to get one in the office for testing – in our lab and in real-world shooting conditions – to find out.

Interestingly, while the D5300 has a GPS unit built-in, the D5500 does not. However, Nikon's GP-1A GPS Unit is available as an optional extra. It should also be possible to add GPS data to images via a smartphone

connected to the new camera's Wi-Fi system.

Like the D810 and D750, the D5500 has Nikon's new 'Flat' Picture Control mode in addition to the usual Standard, Neutral, Vivid, Monochrome, Portrait and Landscape options to tailor the look of JPEGs and video footage. It's also possible to adjust the 'Clarity' settings for each of these modes, along with Saturation, Contrast and Sharpness. The Flat option is aimed at video recording, as it's often desirable to produce flat footage with a wide dynamic range for post-capture adjustment.

On the subject of video recording, the D5500 has the same specification as the D5300 and Full HD (1080) recording is possible at 50/60p.

Although the D5500 uses the



**Above The** touchscreen can also be used to move the autofocus point and shift focus while you're shooting movies.

same EN-EL14a battery as the D5300, Nikon claims the battery life has been increased from 600 shots to 820.

## LIGHT AND COMFORTABLE

Like the D5300, the D5500 has a monocoque (one-piece) construction. However, the new camera is lighter and slimmer. The difference in the depth of the two cameras is particularly noticeable when they are seen from below, and the D5500 is considerably thinner between the lens mount and grip. This thinning has meant the internal layout of the camera has had to be redesigned, but it has enabled Nikon to make the D5500's grip more shapely, while still reducing the overall depth of the camera. As a result the D5500 feels more secure in your hand.

**Touch control**

It's here! And the screen is beautifully responsive



The D5500's touchscreen is very responsive and can be used for navigating the menu, making settings adjustments and setting the AF point. It's even possible to set one of seven features (AF point, sensitivity, Active D-Lighting, HDR, bracketing, AF-area mode, viewfinder grid and aperture) via the screen when the camera is held to the eye.

We'll need to experiment with a full-production sample, but we suspect that it will be best to make on-screen adjustments with the screen flipped out to the side when looking through the viewfinder in order to avoid making changes with your nose!

**Zooming in on the... Nikon 5500D**

While its spec is similar to the D5300's, there are some notable physical differences

The D5500 has the same autofocus, metering and white balance systems as the D5300, but they've had to be laid out differently to fit into the smaller body.

The built-in flash has a guide number of 12m at ISO100 and could be useful for fill-in flash purposes. There's also a hotshoe to mount a flashgun.

The hinge on the screen makes it possible to compose images from odd

As with the D5300, the mode dial provides a route to the Special Effect modes.



Another visible difference between the D5500 and the D5300 is the change in the control dial's location at the top of the camera. On the D5500 it is on the top-plate and the whole thing is visible, rather than just a small section protruding from the back of the camera, making it easier to access and use.

Pressing the 'i' button or tapping that option on-screen reveals a collection of key features for adjustment, including image quality, image size, bracketing, HDR, Active D-Lighting, sensitivity, white balance, Picture Control Mode, metering mode, exposure compensation, flash exposure compensation and flash mode. Tapping any one of these reveals the options available, which you can then adjust via the touchscreen or the navigation control.

**LOOKING AHEAD**

As the D5500 has the same sensor, processing engine, metering, white balance and autofocus systems as the

D5300 we can reasonably expect the quality of the images that it produces to be the same. However, the fact that Nikon has included the D5300's sensitivity expansion settings within the D5500's native range suggests that the new camera's noise control may be a little better — perhaps as much as +1EV better.

**CONCLUSION**

While some may be disappointed that the D5500 doesn't make any huge leaps in pixel count, it's important to remember that 24 million pixels is more than enough for most uses. The files also usually have plenty of detail and don't suffer from excessive noise, while the memory card isn't filled up too quickly.

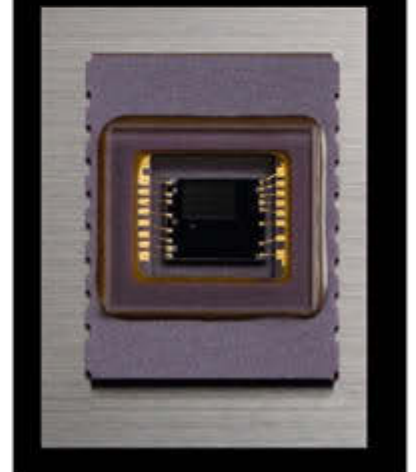
While it's unlikely that any D5300 users will want to upgrade to the D5500, the enhancements made keep it relevant in the current marketplace. It's a solid and versatile camera that looks to be a good option for novices who want to get more creative. 📷



**Above At** 124x97x70mm and 420g (body only) the D5500 is 60g lighter and noticeably slimmer than the D5300, which measures 125x98x76mm and weighs 480g.

**The OLPF story**

Although Nikon reported that the filter over the D800e's sensor had no anti-aliasing properties, the arrival of the D810 revealed that this was in fact not entirely true. However, the sensor in the D5300 and D5500 genuinely has no optical low pass filter, which enables it to record more sharp detail than a comparable sensor with a filter.





## &gt; THE SPECS

Sensor	24.1MP APS-C (DX) format sensor (23.5x15.6mm)
Focal length conversion	1.5x
Memory	SD/SDHC/SDXC
Viewfinder	Optical pentaprism with 100% coverage
Video resolution	Full HD (1920x1080p)
ISO range	ISO 100-6400 expandable to ISO 25,600
Autofocus points	51
Max burst rate	6fps full resolution, 7fps at 15.4MP
LCD	3.2-inch 1,229,000-dot
Weight	765g
Dimensions	135.5x106.5x76mm
Power supply	Rechargeable Li-ion EN-EL15 battery (supplied)

**F**or some, the news that Nikon has updated its 16.2-million-pixel enthusiast-centric D7000 with the introduction of the 24.1-million-pixel D7100 would be cause enough for celebration, but for nerdier types the main source of excitement was that Nikon has omitted the anti-aliasing element from the filter above the chip.

This is something that we've seen before with the Nikon D800E and Pentax K-5IIS, but these cameras are variations on the Nikon D800 and Pentax K-5II that both have anti-aliasing filters. The D7100 isn't available in two varieties and it can only be bought without the filter.

## FEATURES

Like Nikon's more recent SLRs, including the D4 and D800, the D7100 has the EXPEED 3 processing engine. In combination with the sensor, this allows a light sensitivity range of ISO 100-6400, which can be expanded to the equivalent ISO 25,600 if required.

Despite having the same processing engine and pixel count as the D3200 and D5200, the D7100 can shoot at a faster frame rate of 6fps (frames per second). This trumps the D5200 by 1fps and the D3200 by 2fps, potentially making it better suited to sport and action photography.

However, the D7100 has another trick up its sleeve that enables things to be pushed a little bit further with a 1.3x crop mode. This is useful if you need to get a little tighter in on your subject and don't want to crop the image post-capture, and it enables the maximum continuous shooting rate to be boosted to 7fps.



SLR Nikon D7100 > £839 (body only) > [www.nikon.co.uk](http://www.nikon.co.uk)

# Filter-free Nikon

Nikon has taken a risk by leaving the anti-aliasing filter off the D7100's sensor. **Angela Nicholson** decides whether it has paid off

Nikon has further boosted the D7100's sport and wildlife shooting credentials with the inclusion of the 51-point Multi-Cam 3500DX AF module, which has 15 cross-type AF points around the centre of the frame. In comparison, the D7000 has 39 AF points of which nine are cross-type.

Those who think 51 AF points is a bit excessive can opt to restrict the selection to 11 in single AF mode. In continuous AF mode the camera can be set to track the subject using 51, 21 or 9 AF points after the user has selected the starting AF point. Alternatively, there's 3D-tracking available in continuous AF mode, which looks at the colour of the subject and attempts to follow it around the frame.

Like the D7000, the D7100 has a 2,016-pixel RGB sensor that provides data to the Scene Recognitions system that guides the metering, white balance and autofocus systems.

**Above** The weather-sealed D7100 boasts 24.1 million pixels

Users can take control over the colour of their images via the Picture Control modes (Standard, Neutral, Vivid, Monochrome, Portrait and Landscape) with options to adjust the sharpening, contrast, brightness, saturation and hue of the colour modes.

## BUILD AND HANDLING

Although it doesn't have the bombproof air of the Nikon D4, the D7100 feels very nicely put together and has a solid build. Its weatherproof seals also mean that it can be used in a wide range of conditions, and you don't need to head home if the heavens open.

Softly textured coatings on the front and rear grips provide decent purchase, so that the camera feels comfortable in your hand even when carried for long periods.

Although there are a few fairly minor changes to the control layout of the D7100 in comparison with the

## Zooming in on the... Nikon D7100

A quick tour of the camera's key features



Switch between focus modes while looking through the viewfinder



There's a 1.3x crop mode that produces 15.4Mp images



While lock buttons are useful, they can make using the dials a bit fiddly



You have to select to shoot JPEGs before the HDR mode can be used



A mic port and headphone port allow better sound recording and monitoring when shooting videos



The Effects modes are Night vision, Color sketch, Miniature effect, Selective color, Silhouette, High key and Low key



This can be set to one of four uses. We found it best to use it to activate the virtual horizon



Pressing the i button gives quick access to some key features, such as the 1.3x Crop mode, Picture Control mode and HDR mode



D7000, they don't take long to get used to, and upgraders will soon find themselves reaching automatically for the correct controls. The menu system will also be very familiar.

As it's an SLR, the D7100 has an optical viewfinder. This is a bright pentaprism device that shows 100 per cent of the image frame, so you can compose with confidence knowing there won't be any extras appearing around the edges of the image.

Despite the clarity of the viewfinder, where possible we would opt to use the magnified Live View image on the 3.2-inch, 1,229,000 dot LCD when focusing manually. This

**"Autofocus is fast and accurate, getting the subject sharp in next to no time in most situations"**

provides a very detailed view even in fairly bright light that makes it easy to assess critical focus. It would be even more useful if the screen was on an articulating hinge though.

### PERFORMANCE

Nikon is aiming the D7100 squarely at enthusiast photographers, and these users typically shoot a bit of everything, from landscape to sport

and macro to wildlife with all sorts in-between. Consequently, the D7100 needs to be an all-rounder.

With its 51-AF points and 6 or 7fps continuous shooting rate, the D7100 seems like a good choice for sports and wildlife enthusiasts. But even with a Class 10 SD card installed it has a relatively low burst depth. When shooting DX format images we were only able to squeeze out around 12-15 fine quality JPEG images or six raw files before the frame rate dipped below the 6fps maximum. It takes just over two seconds to fire off these JPEG shots (or one second for the raw files), so timing is of the essence – not that this will phase most experienced photographers.

On the plus side, the autofocus system is fast and accurate, getting the subject sharp in next to no time in most situations, and successfully tracking moving objects. Using the new Nikkor 70-200mm f/4G ED lens with the AF-S TC-20E III 2x teleconverter, we were also able to confirm that the AF system continues to function when the maximum aperture falls to f/8. And rather than just the central AF point functioning, in half-decent light the whole array of

### Meet the rivals...

See how the D7100 stands up against the competition



**Canon EOS 60D**  
£609 (body only)  
This 18MP APS-C SLR looks ripe for replacement, but it's still a great camera and has a variangle screen.  
Reviewed: issue 106  
★★★★☆



**Nikon D7000**  
£559 (body only)  
A favourite with enthusiast photographers, this 16.2MP SLR continues in the Nikon range for now.  
Reviewed: issue 107  
★★★★☆



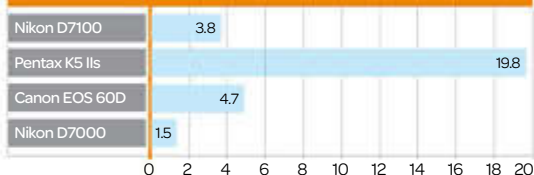
**Pentax K-5 IIS**  
£698 (body only)  
This is identical to the 16MP Pentax K-5II, but without the low pass filter over the sensor.  
Issue reviewed: N/A  
Our score: N/A



## SLR BENCHMARKS

See how the Nikon D7100 fared in our tests

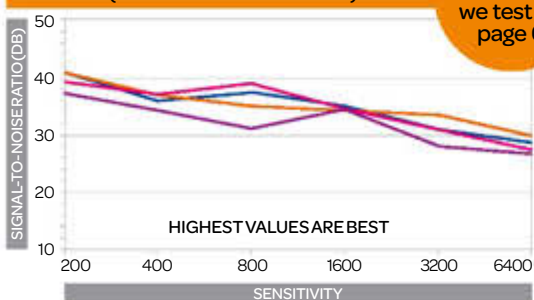
## COLOUR ERROR Closest to zero is best



**COLOUR ERROR RESULT:** Although not as accurate as the D7000, the D7100 puts in a good performance and produces natural colours

**KEY** Nikon D7100 (purple), Pentax K5 IIs (pink), Canon EOS 60D (orange), Nikon D7000 (blue)

## RAW NOISE (AFTER CONVERSION TO TIFF)



**NOISE RESULT:** These results confirm our real world findings and indicate that the D7100 produces noisier images than its rivals

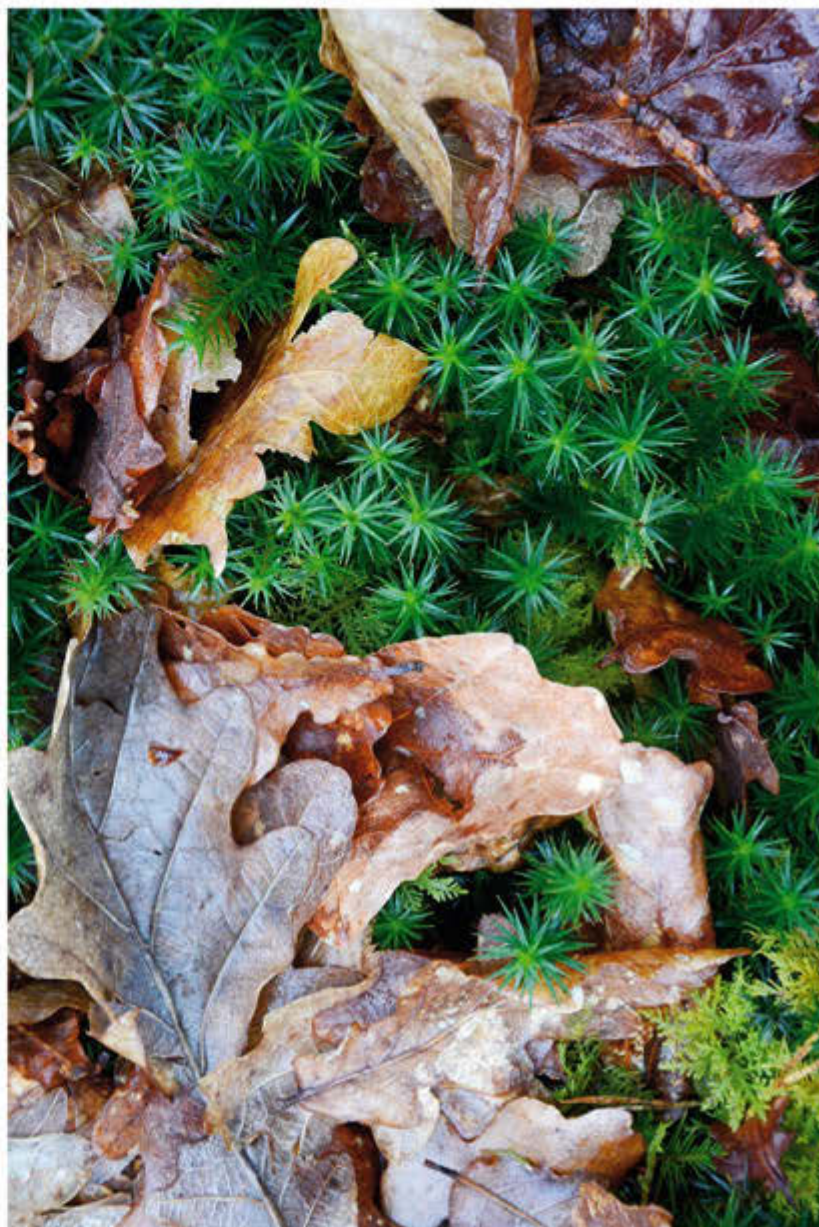
## RAW DYNAMIC RANGE (AFTER CONVERSION TO TIFF)



**DYNAMIC RESULT:** The D7100 has a very high dynamic range at the lower sensitivities, with only the Pentax K-5 IIs beating it at times

## OVERALL BENCHMARK RESULT

Our lab tests confirm that the D7100 is capable of resolving a lot of sharp detail, but that noise is more apparent than in some competing cameras. The dynamic range score isn't the best we have seen, but it's often significantly higher than the older Canon 60D and Nikon D7000 can manage. This shows that the D7100's images can contain a wide range of tones.



of haloing, and a smooth loss of detail as the resolution limit is exceeded.

As the sensitivity level is pushed up, the D7100 manages to record more detail than either the D3200 or D5200. But this is at the expense of a little noise. Comparing high sensitivity images from the D7100 with those from the D5200 and D3200 reveals that the D7100's images have quite a bit more chroma noise. We suspect that Nikon has set the D7100's processing engine to produce noisier images to preserve the detail, as this is more likely to appeal to enthusiasts. Experienced users are more inclined to shoot raw files and process them carefully to strike the right balance between noise and detail resolution than novices, who are more comfortable with the

D3200 and shooting JPEG images.

At ISO 3200 and 6400, the D7100 generally produces images with fine-grained noise without any clumping, or the banding that troubles images from the D5200. As a result they look good when sized to make A3 prints, and they make excellent monochrome images.

There are no surprises with the D7100's automatic white balance system as it manages to cope reasonably well with most lighting conditions that it encounters. As usual though, a custom white balance setting is the best option under mixed or artificial lighting.

In most cases the camera manages to produce vibrant but natural looking colours, only occasionally over saturating bright greens when the

51 are operational, although using the 15 cross-type sensors gets the subject in focus quicker than the outer points. If light levels fall, however, you have to stick with the central AF point.

Our tests indicate that while the D7100 can't resolve more detail than the 24MP D3200 and D5200 at the lower sensitivity settings, the images look slightly sharper at 100 per cent on screen. The images are sharp straight from the camera, with no sign

**Above** Images are very sharp direct from the camera





Landscape or Standard Picture Control options are selected.

The D7000 has a tendency to over-expose the mid-tones, but the D7100 seems a bit more complex. In many situations it delivers a perfect result when left to its own devices, but there were quite a few occasions when shooting under an overcast sky during this test that we had to use the

**Above** The matrix metering gives good results here but a similar shot needed 1EV extra exposure

**Below** The information in the viewfinder shows which autofocus mode is selected

exposure compensation control to get the result we wanted. In most instances we had to dial in 1/3EV or 2/3EV, but some shots required as much as 1EV extra exposure above what the Matrix metering system suggested. Conversely, on a few occasions a little under-exposure was sometimes required to preserve the highlights in the sky.

## VERDICT

All things considered, Nikon has produced an attractive offering for enthusiast photographers that centres around the thing that these users value the most – detail. The D7100 produces sharp, detail rich images straight from the camera, and noise is well controlled up to ISO 6400. However, we wouldn't recommend straying beyond this value and into the expansion range.

Those who like to dabble in sports photography will also be satisfied, provided they are happy to time their shots carefully and not press the shutter release too early. The autofocus system is extremely capable and it gets the subject sharp even in quite low light. Thanks to the 1.3x crop, photographers can also get a little closer to their subject in-camera.

Image colours have typical Nikon punch, with the Standard Picture

## Tech Briefing

### Anti-aliasing filter




**M**ost camera manufacturers use an anti-aliasing filter (AKA low-pass filter) to reduce the risk of interference patterns known as moiré patterning. This can occur when an object with a fine texture that's close to the sensor's resolving limit is photographed. The downside of using a low-pass filter is that it softens the images slightly and this has to be addressed by sharpening the image, post capture.

Nikon claims that the pixel density of the D7100's APS-C format sensor is sufficiently high that there are relatively few occasions when moiré patterning is likely to occur, and consequently no anti-aliasing filter is required. As a result, the D7100 can capture sharper images.

Control setting producing pleasantly vibrant images in most situations.

We usually recommend that you keep an eye on the histogram view when shooting to ensure that images are correctly exposed, and this is sound advice with the D7100 as the Matrix metering system is a prone to under-exposing in some situations. But at least it protects the highlights.

Although Nikon has given the D7100 a pretty extensive feature set, it would have been better if the company had pushed things a bit further, perhaps including Wi-Fi technology in-camera and making the screen touch sensitive. On balance, however, we think that the Nikon D7100 is an enjoyable and rewarding camera to use. 



## Digital Camera

### FEATURES

★★★★★

### IMAGE QUALITY

★★★★★

### BUILD/HANDLING

★★★★★

### VALUE

★★★★★

**Overall** ★★★★★

**WE SAY:** An honest camera that delivers sharp images with bags of detail but some fine-grained noise from sensitivities as low as ISO 400. It's a great choice for landscape, still life and macro enthusiasts.



## &gt; THE SPECS

Sensor	24.3 MP full-frame format (35.9 x 24mm)
Focal length conversion	1x
Memory	2x SD / SDHC / SDXC
Viewfinder	Optical pentaprism (approx 100% cover)
Video	Full HD (1,920 x 1,080) at 60p, 50p, 30p, 25p and 24p
ISO range	100–12,800; expandable to ISO 50–51,200 equivalent
Autofocus points	51 phase-detection points (15 cross-type); contrast detection in Live View and video modes
Max burst rate	6.5fps at full resolution
Screen	3.2-inch, 1,229k-dot tilting TFT
Shutter speeds	1/4,000 sec–30 sec plus Bulb and Time
Weight	750g (body only)
Dimensions	140 x 113 x 78mm
Power supply	Li-ion EN-EL15 (supplied)



SLR Nikon D750 &gt; £1,799 / \$2,297

&gt; www.nikon.com

# Fab full-frame

Nikon's D750 has a new AF system and promises better noise control than the D810. **Angela Nicholson** gives it a test

**T**he latest addition to Nikon's full-frame camera line-up, the D750 sits above the D610 and below the Nikon D810 in the SLR range, and is aimed at enthusiasts. At its heart is a newly designed 24.3-million-pixel CMOS sensor and an Expeed 4 processing engine. Unlike the 36MP D810, however, there's an anti-aliasing filter over the sensor.

This sensor and processor combination enables a native sensitivity range of ISO 100–12,800, with extension settings taking this to ISO 50–51,200. It's also possible to shoot at up to 6.5 frames per second. Some sports photographers may have been hoping for something a bit faster; perhaps 8fps or more.

Better news for action fans is that Nikon has given the D750 a new Multi-Cam 3500 II autofocus module, an updated version of the one in the D810. This has 51 points, 15 of which are the more sensitive cross-type and 11 that operate down to f/8, which is especially useful for photographers who want to use an extender with their telephoto

lenses. As in the D810, the new Group Area AF mode is available to help when shooting subjects that are comparatively small and against a high-contrast or distracting background.

Exposure metering is handled by a 91,000-pixel RGB sensor. There's also a useful highlight metering option, calibrated to take greater note of the brightest part of the scene to prevent it from being burned out.

Enthusiast videographers will appreciate the Full HD video



Above A tilting screen on a full-frame SLR – about time too,

recording at up to 60p, microphone port, headphone port, audio level fine-tuning, Spot White Balance mode, Flat Picture Control mode, and Zebra patterns to indicate which areas are in danger of burning out. The D750 can also output uncompressed footage via an HDMI connection to allow high-quality recording to an external device.

## BUILD AND HANDLING

Nikon has used a monocoque construction for the D750. A combination of magnesium alloy and carbon fibre means it has a good solid feel without excessive weight. It's reassuring to know that the camera has the same degree of weatherproofing as the D810. Inside there's a Kevlar/carbon fibre composite shutter, which has been tested to 150,000 cycles.

The D750 looks similar to the D610. However, the mode dial on



## Stick or twist? Upgrade advice

The D750 introduces a new line for Nikon; consequently there's no direct upgrade path. However, it sits above the D610 (left) in the Nikon SLR range, so photographers looking for a full-frame camera will compare the two. The D750 has more AF

points (51 vs 39), a higher-resolution screen mounted on a tilting bracket, Wi-Fi connectivity and a greater sensitivity range, making it a more versatile camera. However, this expanded feature set adds around £470 / \$500 to the cost.

## Zooming in on the... Nikon D750

Take the layout of the D610 and subtly enhance it



the top-plate has the addition of Effects for accessing the Special Effects modes. A couple of controls on the D610 are also in a different position on the D750 and there's an 'i' button. When this is pressed, a list (rather than the usual grid) of features appears. There are a couple of customisation options (for example Assign Fn button) in this list, and we don't understand why these are

**"The viewfinder isn't the brightest available, but it's still very good and covers 100%"**

in a quick access menu instead of being restricted to the main menu. And surely the 'i' and Info buttons' functions could also be combined into a single control?

The D750 interface has changed a little in comparison with the D610's. When the White Balance button is pressed, for example, the screen shows more clearly which control is used to switch between preset values, and which adjusts the selected value to make images warmer or cooler.

Although the main menu looks at first glance like a close match for those on other Nikon SLRs, a second look reveals that the video options now have their own tab in the menu structure. This is a good move that will help you find the options you want more quickly.

As the D750 is an SLR, there's also an optical viewfinder for composing. This isn't the brightest available, but it's still very good and it covers 100% of the field of view, so there shouldn't be any surprises around the frame edges. If time and subject permits, however, we recommend using Live View when focusing manually.

### Meet the rivals...

The cameras taking on the Nikon D750



**Canon EOS 6D**  
Price: £1,299 / \$1,899  
An excellent 20.2MP full-frame SLR, but there's no flash and the viewfinder only covers 97%.  
Reviewed: issue 135  
★★★★★



**Nikon D610**  
Price: £1,330 / \$1,799  
A 24.3MP full-frame SLR with excellent build and image quality, but a fixed screen and no Wi-Fi.  
Reviewed: issue 147  
★★★★★



**Sony Alpha 99**  
Price: £1,799 / \$1,998  
This 24.3MP SLT has a vari-angle screen, but the AF system is slow in comparison with others.  
Reviewed: issue 136  
★★★★★

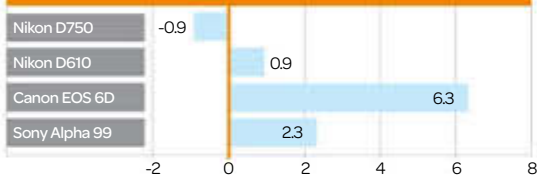


WHAT'S THIS?  
Find out how we test on page 6

## CAMERA BENCHMARKS

How does the Nikon D750 measure up?

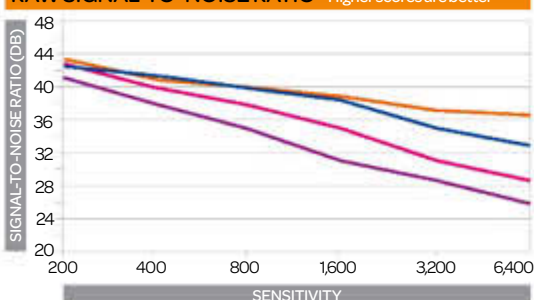
## COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** The D750 is on a par with the D610 for colour error, producing very accurate hues and natural saturation.

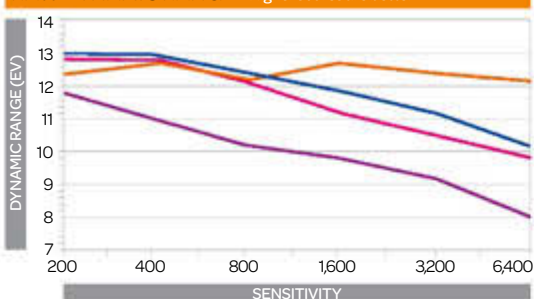
KEY  
Nikon D750 (Purple)  
Nikon D610 (Pink)  
Canon EOS 6D (Orange)  
Sony Alpha 99 (Blue)

## RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** While it lags behind at higher sensitivity settings, the D750 leads at ISO 100 values, indicating lots of detail and little noise.

## RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** Though the D750 doesn't have the highest scores, it doesn't suffer from a low range in real-world images.

## OVERALL BENCHMARK RESULT

Although the D750 doesn't score especially well against the competing cameras for noise control and dynamic range in the lab, it is more than a match for detail resolution and performs especially well at ISO 100. This emphasis on resolution may explain the other slightly lower results.

\* Raw results use images converted to TIFF

## PERFORMANCE

As the D750 has a 24-million-pixel sensor with an anti-aliasing filter, it isn't be able to match the D810 for detail, but it can record a little more than the D610. Our tests also reveal that the D750 controls noise well: even when the noise reduction is turned off in the processing of raw files shot at ISO 6,400, there is only a little coloured speckling visible at 100%. Step up to the native maximum of ISO 12,800 and chroma

Above Bright colours are usually rendered well and with pleasant vibrance

noise becomes more noticeable, but it is still controlled well, and the level of detail is impressive. Simultaneously captured JPEGs have no chroma noise, but there is luminance noise, and images look a little softer at 100%.

Although dynamic range and detail levels drop off at the expansion sensitivity settings, the results still look decent. Even images taken at the maximum sensitivity (ISO 51,200) can make acceptable A3 prints.

In some cases, the D610's screen makes images captured in shade look too cold, which could trick you into setting the wrong white balance. Thankfully, this isn't a problem with the D750, which has the same screen as the D810.

The D750's automatic white balance system also does a very good job in most conditions. The second Auto setting, which is specifically intended to retain the warm notes of warm lighting, is useful on occasion. However, if you really want the warm glow of evening sun to be recorded, the Daylight option is your best bet. Occasionally, there is a colour shift in a sequence of images when using the

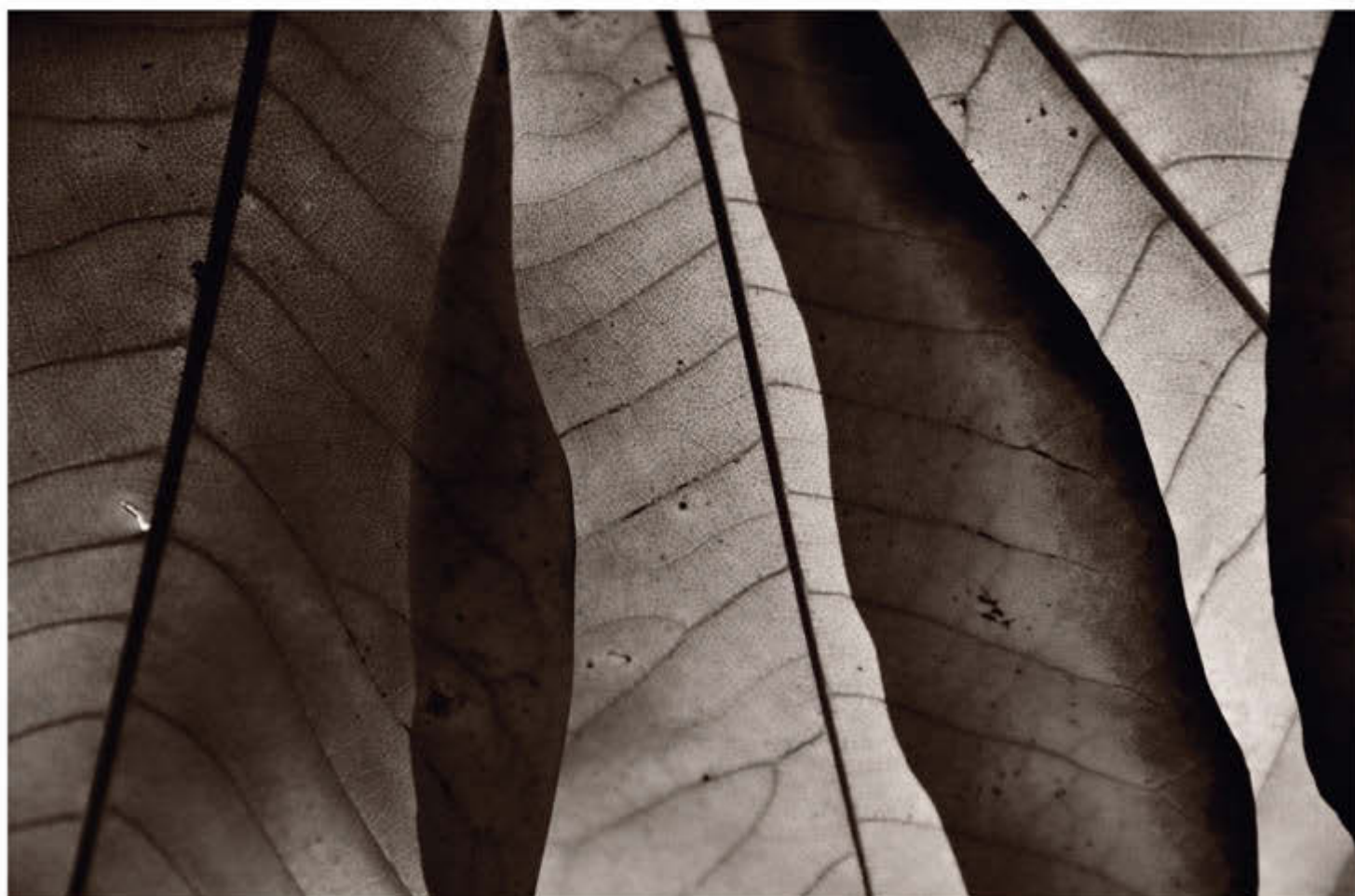
Automatic White Balance settings. It seems likely that the automatic scene recognition system aspect of the processing is responsible.

We have yet to come across an infallible metering system, but the D750's Matrix-metering system is very good. During our testing it managed to deliver perfectly exposed results, even when shooting bright subjects like backlit leaves. Exposure compensation was required on a few occasions, but never when you wouldn't expect – and it wasn't needed on a few occasions when we might have expected it to be.

Nikon has given the D750 an updated version of the AF system from the D810. It performs superbly with a decent lens, gets subjects sharp incredibly quickly and is capable of tracking the subject around the frame when the appropriate mode is selected. The fact that it's sensitive down to -3EV means that it's also useful in low-light conditions. In many situations it still manages to latch onto subjects quickly.

Nikon introduced the new Clarity control to the Picture Control options





**Above** The AF system coped well with this low-contrast subject swaying in the breeze.



**Left** The D750's top plate is almost identical to the one on the D610.

in the D810, and it's present on the D750. It's useful for giving images extra bite. The beauty of the Picture Controls is that they can be used when shooting raw and JPEG files simultaneously, so you have a full colour file as well as a treated JPEG.

Conversely, rotating the mode dial to the Special Effects option results in only JPEG images being recorded. These Effects can be previewed in Live View mode. In many cases previewing an Effect is enough to convince you not to use it.

By including Wi-Fi connectivity in the D750, Nikon has gone a step further than Canon with its 7D Mark II for those wanting to control the camera remotely. However, Nikon's free Wireless Mobile Utility app only offers limited control over the camera. It's in effect just a wireless remote.

### VERDICT

The D750 is a great camera. Its Matrix-metering system is very capable, delivering correct exposure in a wide range of situations, and it produces images that have natural yet vibrant colours. It may not offer the

class-leading detail resolution of the D810, but it's more than a match for the D610 in this respect. The D750 captures an impressive level of sharp detail, and noise is controlled well.

One of the D750's biggest selling points, however, is its AF system. There's an array of AF modes offering pro-level control and customisation.

It's a shame, though, that Nikon hasn't taken the opportunity to correct some of the handling oddities of the past and make features like the Special Effects and HDR mode more attractive to enthusiasts. 📷

Digital Camera			
FEATURES		BUILD QUALITY	
★★★★★		★★★★★	
IMAGE QUALITY		VALUE	
★★★★★		★★★★★	

**Overall** ★★★★★

**WE SAY:** Although we have a few niggles with the D750, it is an excellent camera. It has a professional-level AF system, and is capable of producing superb images even in tricky conditions.



## &gt; THE SPECS

Sensor	36.3MP full-frame format (35.9 x 24mm)
Focal length conversion	1x
Memory	CF and SD / SDHC / SDXC
Viewfinder	Optical pentaprism (approx 100% cover)
Video	Full HD (1080p) at 60p, 50p, 30p, 25p and 24p
ISO range	64 to 12,800, expandable to ISO 32-51,200 equivalent
Autofocus points	51 phase detection points (15 cross-type); contrast detection in Live View and video modes
Max burst rate	5fps at full resolution
Screen	3.2-inch, 1,229,000-dot TFT
Shutter speeds	1/8000 to 30 sec plus Bulb and Time
Weight	880g (body only)
Dimensions	146 x 123 x 81.5mm
Power supply	EN-EL15 rechargeable lithium-ion battery



SLR Nikon D810 > Body only: £2,499 / \$3,297 > [www.nikon.com](http://www.nikon.com)

# Big shoes to fill

The D810 succeeds a much-loved full-frame SLR. **Angela Nicholson** finds out whether it's a worthy successor...

**T**he Nikon D810 has a lot to live up to. It replaces two SLRs popular among enthusiast and pro photographers in recent times: the D800 and the D800E. These two cameras are identical apart from the fact that the D800E has a weaker anti-aliasing (AA) or optical low-pass filter over its sensor. They are especially popular with landscape photography lovers, who want something a bit lighter (and more affordable) than a medium-format camera.

## FEATURES

Given the 36.3-million effective pixel count of the D800, it's no surprise that the D810 has the same number of photosites on its sensor; but we are told that it uses a newly designed chip and Nikon's latest Expeed 4 processing engine. Unlike the D800E, the D810 has a filter with no AA properties at all. This should help it record more sharp detail.

Other changes from the D800 include a higher-resolution rear display, the ability to record small raw

images (useful for animators) and the D4S's AF system with Group-area AF mode. The move to the Expeed 4 processing engine also takes the maximum continuous shooting rate at full resolution up from 4 to 5fps. Alternatively, the D810 can shoot at 7fps in DX format and record 15.3MP images. Helpfully, the buffer capacity has also increased: the D810 can record 47 lossless compressed 12-bit raw files in a single burst rather than 21, or 23 uncompressed 14-bit raw files instead of 16.



Above An optional battery grip for the D810 enables easier upright shooting

You can set sensitivity in the native range ISO 64-12,800, and there are expansion settings of ISO 32-51,200, giving greater scope for shooting at wide apertures or in bright conditions as well as better low-light capability.

The D810's video capability improves on the D800, with the ability to shoot at 50p and 60p, and a Zebra display mode that shows areas close to burning out. There's also a new Flat Picture Control mode, which reduces sharpening and contrast to maximise dynamic range for better post-capture grading. In another change to Picture Controls, it's now possible to adjust image clarity or micro-contrast to give an impression of greater (or reduced) sharpness without over-emphasising edges.

Furthermore, Nikon has given the D810 a new shutter and mirror box mechanism that it claims reduces vibration, giving a steadier viewfinder image with less blackout for better



## Stick or twist? Upgrade advice

The D800 (left) was a huge leap forward from the 12.1MP D700, and the D800E introduced the concept of 'omitting' the anti-aliasing filter over the sensor in a 35mm-format SLR. The D810 doesn't take such a significant step forward, but it's a solid

successor to the D800. However, few D800 owners will find enough new to make it worth upgrading – unless, perhaps, you are keen to get the better autofocussing and improved burst depth for capturing sport and action or wildlife.

## Zooming in on the... Nikon D810

A quick tour of the camera's key features



autofocussing and sharper images. Vibrations can be further reduced by using the new electronic front-curtain shutter in Mirror Lock-Up or Exposure Delay mode.

### BUILD AND HANDLING

Any D800 owner who picks up a D810 will feel at home. There are only a few design changes: the rear grip is a little more pronounced, the front grip is slightly more ergonomically shaped, and the memory card door feels more durable. The changes to the grips make the D810 feel a fraction more comfortable and secure.

**"The changes to the grips make the D810 feel a fraction more comfortable and secure"**

The metering switch on the back of the D800 has also gone, making the AE-Lock/AF-Lock and AF-on buttons easier to operate with the camera held to the eye. Metering options are now accessed via what was the bracketing button, above the drive mode dial on the top. We generally prefer a switch or dial for setting selections because it's usually quicker and easier, but the

change to a button for metering isn't a deal-breaker.

The most noticeable difference is the introduction of an 'i' button on the back. This gives access to some key settings, such as Active D-Lighting, and it works in the same way as it does on Nikon's other recent SLRs. It is particularly useful when shooting in Live View or Video mode, and it provides the means of accessing the Split-screen view. However, as we have said before, it seems strange having options to change some of the customisation settings via this information screen in reflex shooting mode. It would be better to keep the options for changing the functions of the preview and Fn buttons, for example, in the main menu. This would free up space in the information screen for features such as Exposure Delay that may need to be accessed on a shot-by-shot basis.

We'd also like to be able to make adjustments via the Information display that pops up when the Info button is pressed. As it stands, this displays key camera settings, but they can't be changed. It feels like a waste and a bit of an overlap in buttons.

### Meet the rivals...

See how the Nikon D810 stands up against the competition



#### Nikon D800

Body only: £1,880 / \$2,997  
The D800 should be available at a bargain price for a while. It's still an excellent camera.  
Reviewed: issue 125  
★★★★★



#### Sony Alpha 7R

Body only: £1,510 / \$2,298  
It doesn't have the AF speed of the D810, but this full-frame CSC can match the SLR for resolution.  
Reviewed: issue 147  
★★★★★



#### Canon EOS 5D Mark III

Body only: £2,299 / \$3,399  
With 22.3MP, this can't match the D810 for detail resolution, but its handling is superb.  
Reviewed: page 30  
★★★★★

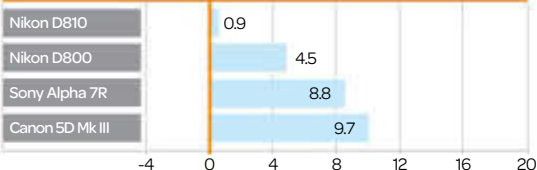


WHAT'S THIS?  
Find out how we test on page 6

## CAMERA BENCHMARKS

How does the Nikon D810 measure up?

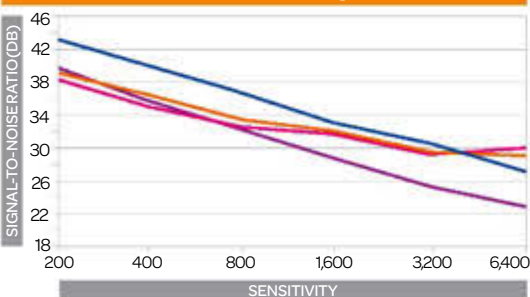
## COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** These results show that the D810 is comfortably the most accurate camera for colour in this group.

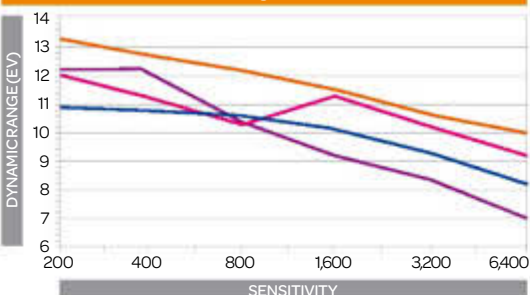
**KEY** Nikon D810 (purple), Nikon D800 (pink), Sony Alpha 7R (orange), Canon EOS 5D Mk III (blue)

## RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** Bringing out more detail appears to make the noise in the D810's images more visible to our lab testing system.

## RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** This indicates that the D810 can record a wide range of tones, although it can't match the Sony A7R.

## OVERALL BENCHMARK RESULT

At 100% the D810's mid- and high-sensitivity images look subtly different from the D800's. Thanks in part to the lack of an AA filter, they look sharper, but the noise also looks finer and less clumped. They also have more detail. Although we think the images look better, this appears to make the noise more visible to our lab test, so its scores are poorer.

\* Raw results use images converted to TIFF

- ➊ D800 users will notice straight away that the mirror and shutter movements are much quieter and feel more dampened in the D810. It makes the camera much more discrete and conveys a sense of better quality.

Another operational difference becomes apparent in Live View mode, where the D810 displays images much more quickly after a shot has been taken than with the D800. The contrast-detection autofocus system,

**Above Right** Thanks to the huge pixel count, there's lots of detail. As there's no anti-aliasing filter, it looks sharp from the camera

"Even a shot taken in low light at ISO 3,200 can withstand being viewed at A2 size"



however, operates at a similar speed. It's not a patch on that of a CSC, but it's usable provided the camera is held on a tripod.

## PERFORMANCE

Although they have a little more detail if you really look for it at normal printing sizes, images direct from the D810 don't look dramatically different from those from the D800. As a rule they have pleasant, vibrant colours, natural white balance when the Auto setting is used, and good exposure in most conditions when the Matrix metering system is employed.

Noise is generally controlled well, and shots taken at higher sensitivity settings look very good at normal

viewing and printing sizes. Examining these images at 100% on-screen reveals that noise has a finer texture from the D810 than from the D800; there's less smoothing or clumping. This may make the noise more visible to our lab testing system, but it helps with the impression of detail.

Getting every last scrap of detail from the D810 often demands that the camera is on a tripod, the optimum aperture is set and exposure delay is employed along with the front shutter, and that the subject is motionless. At ISO 100, 1/250 sec and f/8 however, you can expect to be scrutinising the weave of the shirt in a head-and-shoulders portrait and nodding contentedly that the pixel count is worthwhile. Even a shot taken in low light at ISO 3,200 can withstand being viewed at A2 size.

Our lab testing indicates that using the front shutter instead of the standard unit makes a slight



but insignificant difference to detail resolution, but it's possible that the degree of impact varies with the solidity of your tripod. Using Exposure Delay mode, which fires the shutter a little after the mirror has

**Above** Shooting at f/2.8 at 150mm has restricted depth of field nicely, but there's lots of detail in this ISO 100 shot

lifted, however, has a dramatic impact. You won't necessarily see obvious movement, but the image lacks the detail resolution that you get when it is employed.

Given its pixel count and the huge files it produces, it's unlikely that the D810 would be the choice of many professional sports photographers. However, its autofocus system is more than capable of getting moving subjects sharp and tracking them across the frame. It can also operate in very low light levels. All of these factors combine to make the D810 a good all-rounder, which can be used for shooting a variety of subjects in a wide range of conditions.

## VERDICT

Given that the D800 already had a 36MP sensor, it seems unreasonable to expect more in the D810's sensor. Many D800 users already mention (or complain) about the size of the files and the need to upgrade their computer and storage capacity. The tiny photosites are also susceptible to very small movements which means that the camera often needs to be on a decent tripod and used in Exposure Delay mode to get any benefit.

Without these 'rules' being obeyed, there are times when you may as well have a lower-pixel-count camera that delivers manageable file sizes.

However, just about everything else that's important has changed. The sensor and processing engine are new and allow a non-expansion sensitivity setting of ISO 64, which allows you to extend the exposure time that little bit further without needing a neutral-density filter. The updated AF system is both fast and accurate, the main screen has a higher dot count and the maximum continuous full-resolution shooting rate has gone up by 25%. Oh, and the images are superb. 📷

**Digital Camera**

FEATURES	BUILD QUALITY
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** The Nikon D810 is an excellent camera that's well-suited to landscape, still-life and macro photographers, yet is also capable of delivering superb sport, action and wildlife photos.

From the makers of **Digital Camera** magazine



**Left** The grip feels just a little better than the D800's



## &gt; THE SPECS

Sensor	16.23Mp full-frame (36x23.9mm) CMOS
Focal length conversion	1x
Memory	Dual slot for CF and XQD
Viewfinder	Optical pentaprism with 100% cover, 0.7x magnification and 18mm eyepoint
Video	Full HD (1920x1080p) at 60p, 50p, 30p, 25p, 24p
ISO range	100 to 25600, expandable to ISO 50-409,600
Autofocus points	51 (15 cross-type)
Max burst rate	11fps
Screen	3.2-inch, 921,000-dot TFT LCD
Shutter speeds	1/8000-30 sec plus bulb
Weight	1,180g (body only)
Dimensions	160x156.5x90.5mm
Power supply	Rechargeable EN-EL18a Li-ion battery (supplied)

SLR Nikon D4s > £4,679 / \$6,497 (body only) > [www.nikon.com](http://www.nikon.com)

# Speed demon

Nikon's fastest SLR has got a little bit faster and a little bit better. **Angela Nicholson** buckles up to take it for a spin

S

ince its launch in January 2012, the Nikon D4 has been the camera of choice for professional

photographers who need the ultimate in speed, low-light shooting capability and AF performance. It's also built to survive heavy use in the type of conditions that news reporters find themselves in on a regular basis.

The D4s makes a relatively subtle upgrade to the D4, keeping with the same pixel count, but making a few refinements that can be largely attributed to the move to the newer Expeed 4 processing engine.

## FEATURES

Nikon has been pretty tight-lipped about the changes to the D4s's sensor, but we are told that it's new, and has an effective pixel count of 16.23 million, while the D4's count is 16.25 million. The pixel pitch, however, remains the same at 7.3um.

Nikon claims that the new sensor and Expeed 4 engine combination results in an approximately 1.5EV

improvement in noise performance, and this has given the company the confidence to expand the D4s's native sensitivity setting by 1EV over the D4's to ISO 100-25,600. The expanded range is ISO 50-409,600.

Thanks to the Expeed 4 processor, the D4s has a maximum continuous shooting rate of 11fps. The D4 can manage this speed, but not the



Above Controls are well laid out and easy to use

requisite ability to focus and meter between shots. The buffer capacity has also been increased, enabling as many as 200 JPEG Fine-quality files or 60 uncompressed 14-bit raw files to be captured in a single burst. We found this was possible with a UDMA 7 CompactFlash card or an XQD card installed.

## BUILD AND HANDLING

The D4s has a new mirror mechanism, which has better dampening than the D4's, to give a more stable image in the viewfinder and shorter blackout between frames; this probably explains why the camera is able to focus when shooting at 11fps.

Nikon has improved the autofocus algorithms for the D4s, and it uses an advanced version of the Multi-CAM 3500AF module found in the D4. It adds Group-Area AF mode to help when shooting subjects that are

## Meet the rivals...

See how the D4s stands up against the competition



**Nikon D4**  
£4,400 / \$5,997  
(body only)  
Many pros are snapping up the superb D4 at a discount while they can.  
Reviewed: issue 127  
★★★★★



**Nikon Df**  
£2,125 / \$2,997  
with 50mm f/1.8 lens  
It has the same 16.2MP sensor and Expeed 3 processing engine as the D4.  
Reviewed: issue 148  
★★★★★



**Canon EOS-1Dx**  
£4,845 / \$6,799  
(body only)  
Canon's 18.8MP top-end SLR is on a par with the D4s, but can't quite match it in low-light.  
Not reviewed

**WHAT'S THIS?**  
Find out how we test on page 6

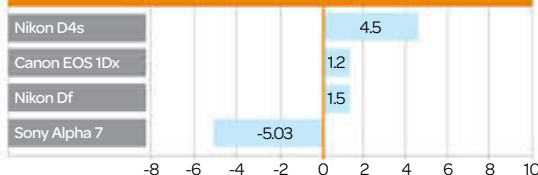
# SLR TEST

NIKON D4S

## SLR BENCHMARKS

How does the Nikon D4s measure up?

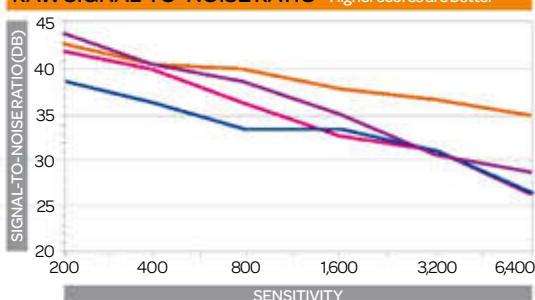
### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** The D4s's colour is not as accurate as the others, but images have good saturation straight from the camera.

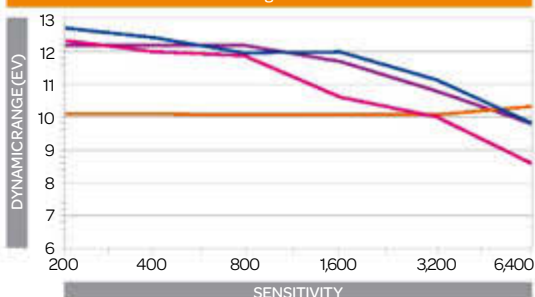


### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** Although the D4s leads the way at lower sensitivity settings, the Canon 1Dx pushes ahead from about ISO 800.

### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** Nikon shows its prowess with dynamic range. D4s files have a wide range of tones and scope for adjustment.

### OVERALL BENCHMARK RESULT

In tests, the D4s can out-resolve the Canon 1Dx and maintain detail (in good light) better at higher sensitivity settings. Real-world images show a rather different result in conditions where high ISO levels are required.

\* Raw results use images converted to TIFF

**Above left** The autofocus system locks on to moving subjects quickly, even in low light

comparatively small, and close to a distracting background. While the change to the shape of the memory card bay door suggests Nikon hasn't used the same mould for the D4s as it did for the D4, most of the other changes to the design are so subtle as to be almost invisible. That's no bad thing, however, as the camera remains very comfortable in the hand whether you're using the horizontal or vertical grip.

The two mini-joystick-style selector controls on the back have a new firmer finish, which makes them easier to find and use when you're wearing gloves, or in the wet – they're easier to identify when the camera is held to the eye than the rubber-topped controls on the D4.

As on the D4, the vertical shutter release is a little recessed into the body. While this button is still easy to reach, it does make the front command dial less prominent than

the horizontal one, and it's harder to find with your finger. Other controls fall within convenient reach, and are as responsive as you'd expect from a pro-end SLR. The D4s has an optical viewfinder, and it's a great one, showing 100% of the scene and being large and bright.

### PERFORMANCE

The D4's AF system is no slouch, but the D4s's raises the game even further. The peripheral AF points seem a little more responsive, and the new Group-Area AF mode does an

**“Controls fall within convenient reach, and are as responsive as you'd expect from a pro-end SLR”**

excellent job of keeping a moving subject sharp. Apart from the number of points involved (five in Group-Area AF), it's a little unclear how this differs from the 9-, 21- and 51-point dynamic-area AF modes, though.

While the Matrix metering system copes well with average and bright scenes, there is a slight (and understandable) tendency towards overexposure with some dark scenes. It's not a major issue, and it only seems to occur in the conditions in



## Zooming in on the... Nikon D4s

A quick tour of the camera's key features



The D4s uses an advanced version of the D4's Multi-CAM 3500AF module. This adds Group AF mode to help shoot small subjects.



Although the D4s is a full-frame SLR, it's compatible with DX (APS-C) lenses, and is capable of cropping the frame automatically.



The AF options are selected by pressing the dedicated button on the front of the camera while rotating a command dial.



The two mini-joystick-style selector controls have a new firmer finish, making them easier to locate and use when wearing gloves or in the wet.

The D4s has a 12-bit uncompressed S (small) raw mode that can record 4MP images.



The D4s has a metal bodyshell, and weather-sealing around all the controls and ports.



which a professional photographer might anticipate it.

Although a pixel count of 16 million may be comparatively low by modern standards, especially considering that Nikon favours 24 and 36MP sensors, the D4s can resolve an impressive level of detail, which is maintained a little better throughout the sensitivity range than by the D4. There's also little sign of noise throughout the native sensitivity range, although higher-ISO

**"The burning question that the D4s raises is: what does an ISO 409,600 image actually look like?"**

JPEGs look slightly smoothed at 100% on screen.

The burning question that the D4s raises, then, is: what does an ISO 409,600 image look like? And the answer is – pretty terrible. Even at small viewing sizes, banding is visible in JPEGs, and on closer scrutiny they exhibit a cross-hatched pattern.

The raw files look a little better, but there's still some banding. However, this is not a sensitivity setting for everyday use – it's designed to be used by pros reporting important events in near-darkness.

### THE VERDICT

The Nikon D4s delivers images that are big enough for most purposes without slowing down processing times, hampering continuous shooting rates or filling up memory cards and hard drives too quickly.

Our tests show that the D4s builds on the successes of the D4 with an

improved AF system, better detail reproduction at higher sensitivity values and extended low-light capability. While it can be used for just about any genre of photography, the D4s is rather unlikely to be the camera of choice for enthusiast or professional landscape photographers, who are probably going to find themselves drawn to a smaller, lighter model with a higher pixel count – such as the D800E.

The D4s is a great camera, but we can't help wondering why there is no built-in Wi-Fi connectivity and GPS tagging available.

Digital Camera	
FEATURES	BUILD QUALITY
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** A great workhorse for professional photographers, the Nikon D4s is built to last, and will capture great shots in some types of lighting conditions that other cameras can't.





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INTERVIEW

## DON McCULLIN

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## &gt; THE SPECS

Sensor	16.1MP Micro Four Thirds format (17.3x13mm)
Focal length conversion	2x
Memory	SD/SDHC/SDXC
Viewfinder	Electronic viewfinder with 1,440,000 dots (approx 100% cover)
Video resolution	1080p
ISO range	100-25,600
Autofocus points	81
Max burst rate	8fps (AF and exposure locked at start)
Screen	Tilting three-inch, 1,037,000-dot touchscreen
Shutter speeds	1/4,000-60 sec plus Bulb
Weight	350g (body only)
Dimensions	119.1x82.3x45.9mm
Power supply	BLS-5 rechargeable lithium-ion battery (supplied)

**T**he OM-D E-M10 is the third model in Olympus's highly respected OM-D series of Micro Four Thirds

compact system cameras. It now sits beneath the OM-D E-M5 (the original OM-D) and the OM-D E-M1 as the entry-level option.

Despite its starter status, however, it has many high-end features from the E-M5, as well as a few from the top-end E-M1. The Four Thirds type (17.3x13mm) 16.1-million-pixel LiveMOS sensor and 1,440,000-dot electronic viewfinder, for example, are also found in the E-M5.

## FEATURES

Olympus has coupled the E-M10's sensor with the same TruePic VII processing engine that's found in the E-M1. This combination allows a shutter speed range of 1/4,000-60 sec (plus Bulb and Time shooting), a sensitivity range between ISO 100 and ISO 25,600 and an exposure compensation range of +/-5EV. The E-M10 can shoot continuously at up to eight frames per second, although focus and exposure are locked at the start of the sequence.

Because the E-M10 uses the same sensor as the E-M5, it doesn't have the phase-detection pixels of the E-M1, so focussing is carried out by contrast-detection alone. There are 81 AF points available, which can be selected individually or in groups of nine. In addition to Single AF mode, you can choose between Continuous AF, Manual Focus (MF), Single AF + MF and AF Tracking. Manual focus is aided by the ability to magnify



**CSC** Olympus OM-D E-M10 > £529 / \$699 (body only)

> [www.olympus.co.uk](http://www.olympus.co.uk)

# Best of three

Olympus's third OM-D, the E-M10, has many features of the original in a smaller body. **Angela Nicholson** takes a look...

specific areas of the scene and by focus peaking, which highlights the areas of highest contrast. Face Detection AF is also available and can be augmented with Eye Detect AF, Left, Right and Near side priority.

Although the E-M10 is the most affordable camera in the current OM-D range, it still has plenty of advanced features to offer enthusiast photographers. There's full control over exposure when you want it, as well as the Aperture Priority and Shutter Priority modes you'd expect. Images may also be shot in raw or JPEG format – or both together, which is useful when using one of the 19 Art Filter modes, as you can have a JPEG image with the effect applied alongside a 'clean' raw-format file for post-processing.

Olympus has also included Wi-Fi connectivity, and the camera can be controlled remotely via a smartphone or tablet using the Olympus Image

**Above** Olympus hopes the new OM-D E-M10 will find favour in the same way as the OM-10 did when it was launched in 1979

Share app. Available for both iOS and Android, the Image Share app affords control over all the key exposure settings. It's even possible to remotely change exposure mode from the setting on the mode dial.

The E-M10 has the same 1,440,000-dot electronic viewfinder as the E-M5, but adopts the E-M1's Adaptive Brightness Technology to vary the finder brightness in response to ambient lighting.

## BUILD AND HANDLING

Although it's smaller than either of the earlier OM-D cameras and doesn't have their dust- and splash-proof build, the E-M10 has a metal body and it feels sturdy in the hand. Owning a small camera can sometimes mean that the controls are cramped together or they're awkward to hold, but the E-M10 is exceptionally comfortable. It feels secure in your grasp, thanks to its



Unlike the other OM-Ds, the E-M10 features a small pop-up flash



It's easy to connect to the Wi-Fi system and the Image Share app



No weatherproofing means you need to take care in wet conditions



A tilting screen isn't as useful as one on a fully articulating hinge

## Zooming in on the... Olympus E-M10

A quick tour of the camera's key features



Although there's an Art Filters mode, effects can be applied in the other exposure modes to retain control over the settings

These two dials are within easy reach and allow exposure settings to be adjusted quickly



Quick access to Highlights and Shadows, Color Creator, sensitivity, and other options



front grip and strategically placed thumb pad. The controls are nicely spaced and within easy reach, using the same layout as the E-M5.

The E-M10 combines an extensive array of buttons and dials with touchscreen control. The Super Control Panel can be operated via the screen, and you can set the AF point and trip the shutter with a tap on the monitor. While the tilting screen provides a clear view in many conditions, including quite bright light, it feels more natural to use the viewfinder in many situations. This also provides a detailed view, with a

## "Connecting the E-M10 to a smartphone or tablet using the built-in Wi-Fi system is easy"

slight increase in micro contrast to remind you that it's an electronic rather than an optical finder.

Connecting the E-M10 to a smartphone or tablet using the built-in Wi-Fi system is easy via the free Olympus Image Share app. Although there's no NFC (Near Field Communication) chip, initial set-up is simple: the camera's screen displays

a QR code, which the phone scans to obtain the necessary data. After this is done once, you just touch Wi-Fi on the camera's screen and wait a couple of seconds to activate the system. Now you can start the smartphone app and select your preferred option: Remote Control, Import Photos, Edit Photo or Add Geotag.

The camera responds quickly to setting adjustments made via the phone, and the system provides a convenient method of controlling the camera when shooting from awkward angles or tight spots. The only downside is that the digital level isn't displayed on the phone screen, so you can't be sure the horizon will be level.

It's useful to control the camera remotely via the app when shooting in Live Bulb or Live Time mode, as it avoids introducing blur when you touch the camera.

## PERFORMANCE

Because the E-M10 has the same sensor as the E-M5 and the same processing engine as the E-M1, we had high expectations for its image quality. These expectations have not been disappointed: the camera is

## Meet the rivals...

See how the E-M10 stands up against the competition



**Fujifilm X-E2**  
Price: £549 / \$799 (body)  
An excellent CSC, with traditional controls and high build quality to match its superb images.  
Reviewed: issue 150  
★★★★★



**Canon EOS 70D**  
Price: £815 / \$1,000 (body)  
A high-quality SLR, with a responsive touchscreen display and wireless connectivity built-in.  
Reviewed: issue 144  
★★★★★



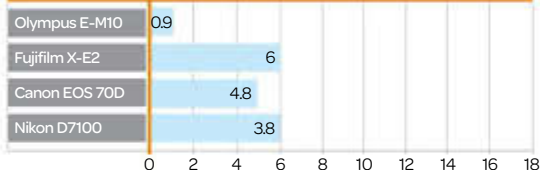
**Nikon D7100**  
Price: £810 / \$1,050 (body)  
Produces sharp images, but noise appears on the scene quite early on in the sensitivity range.  
Reviewed: page 52  
★★★★★



## SLR BENCHMARKS

How the Olympus E-M10 fared against others

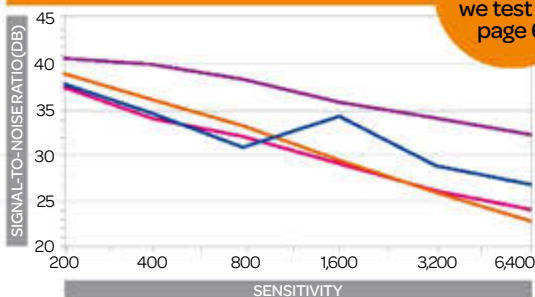
## COLOUR ERROR Closest to zero is best



**COLOUR ERROR RESULT:** Our tests show that the E-M10 maintains colour accuracy very well, beating all of its test rivals.

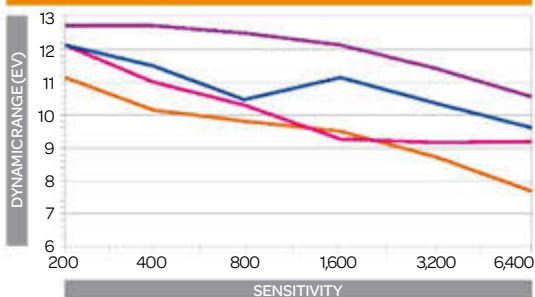
**KEY** Olympus E-M10 (purple), Fujifilm X-E2 (pink), Canon EOS 70D (orange), Nikon D7100 (blue)

## RAW SIGNAL-TO-NOISE RATIO\*



**NOISE RESULT:** The E-M10 compares favourably with the others here, although at the expense of resolution at the highest ISO values.

## RAW DYNAMIC RANGE\*



**DYNAMIC RESULT:** A rather impressive result for dynamic range indicates that the images have a wide range of tones.

## OVERALL BENCHMARK RESULT

Our tests show that the E-M10 has a great dynamic range. While our real-world images confirm this, it comes coupled with a slightly flatter look to JPEGs than the Fujifilm X-E2 produces, when using the default Natural picture mode.

\* Raw results use images converted to TIFF

capable of producing superb images with plenty of detail.

Noise is controlled well in JPEGs taken at up to around ISO 6,400, at which point some smoothing and slight loss of detail is evident in images viewed at 100% on screen. As usual, this softening increases with sensitivity; while the top value of ISO 25,600 produces respectable results, many photographers are likely to keep it for emergencies only.

Luminance noise is visible from

**Above left** The tilting screen is useful when shooting very low



around ISO 1,600 when viewing an image at 100%, but it only starts to become noticeable at normal viewing sizes at about ISO 6,400. Chroma noise (coloured speckling) isn't an issue in high-sensitivity JPEG shots, even in the darker areas.

Olympus's general-purpose ESP metering system performs well in a range of situations, and delivers good exposures. Naturally, it's not completely foolproof, and the exposure-compensation facility can come in handy on occasion. During our tests, it was usually to decrease the exposure a little in high-contrast conditions. Reducing the exposure of a bright landscape by -1/3EV can also play dividends in colour saturation.

On the subject of colour, the E-M10 generally produces natural-looking hues in its Natural Picture mode, and the automatic white balance system copes admirably with most natural lighting conditions. As is often the case, however, it struggles

a little under artificial light, when a bespoke setting via the manual white balance control is the best option.

As the E-M10 has an anti-aliasing (AKA optical low-pass) filter, we thought that it may not be able to resolve quite as much sharp detail as the E-M1 – but judging by our resolution chart images, it can. In fact, it can resolve a little bit more than the E-M1 and the E-M5 at some low and mid-range sensitivity settings, although there's not a lot in it. Its resolution score drops off at the higher end of the sensitivity scale, however, probably because of the noise control system. There is still a good impression of detail visible at normal viewing sizes.

In normal daylight conditions, the E-M10's autofocus system is fast and accurate. It's even able to keep up with quite fast-moving subjects, and in AF Tracking mode it can keep it sharp as it moves around the frame. Flushed with confidence at this success, we



## Tech briefing

### Live modes



**M**ost cameras have a Bulb mode in which the shutter stays open for as long as the shutter release is held down. It's especially useful for making long exposures when using a remote release.

Olympus has built on this with its Live Bulb, Live Time and Live Composite modes, in which the image is seen to develop on the camera's screen. It means that rather than calculating or guessing the exposure time, the photographer can see when the image looks right and close the shutter.

In Live Bulb mode, the shutter stays open for as long as the shutter release is triggered; in Live Time mode, one press opens the shutter while a second closes it. In Live Composite mode, meanwhile, a sequence of exposures are all combined into one with every press of the shutter release.

It's a little surprising that the camera resolves quite so much detail, though, especially considering that its sensor has an anti-aliasing filter. Our lab results show that the E-M10 fares well against popular SLRs such as the Canon 70D and Nikon D7100, but it's clear that the AF system needs some work if the camera is going to compete fully with an SLR.

All things considered, we think the Olympus OM-D E-M10 is a great little camera. It has lots of useful features in a small body, and delivers high-quality images. 📷

## Digital Camera

### FEATURES



### IMAGE QUALITY



### BUILD QUALITY



### VALUE



## Overall ★★★★★

**WE SAY:** Small and light enough to use as a carry-round camera, the OM-D E-M10 affords lots of control, feels good in the hand, has a great control layout and produces superb images.

From the makers of **Digital Camera** magazine



took the OM-D E-M10 to a funfair at night to see how it would deal with erratically moving subjects under low-light conditions. Sadly, it proved too much for the camera's contrast-detection AF system: although it was able to cope with stationary subjects, the system wasn't quick enough to

**Above** This image took 5.5 seconds at ISO 100 and f/18

**Below** The E-M10 is constructed from metal, so feels solid

lock onto fast-moving subjects in the low artificial light. We did manage to get a few sharp shots of a mini rollercoaster. In continuous AF mode, provided we kept the active AF point over the moving subject, the camera was able to get it sharp and stayed with it as it moved towards the camera.

## VERDICT

Given that it has much in common with Olympus's other OM-D cameras, we expected the E-M10 to produce high-quality images. It's a





## &gt; THE SPECS

Sensor	16.1MP Four Thirds Live MOS sensor
Focal length conversion	2x
Memory	SD/SDHC/SDXC
Viewfinder	None
Video resolution	Full HD (1,920x1,080)
ISO range	ISO 200-25,600
Autofocus points	23
Max burst rate	8fps
LCD screen size	3-inch, 460,000 dots
Shutter speeds	1/16,000-60 seconds
Weight	204g (inc battery and memory card)
Dimensions	98.5x54.9x30.4mm
Power supply	Li-ion battery

**T**he GM1 starts a new line for Panasonic, bringing the total up to five: G, GF, GX, GH and now GM, the smallest and lightest available. The GM1 is primarily aimed at beginner photographers, especially those stepping up from a compact camera or mobile phone. That said, with its convenient size, those with other interchangeable-lens cameras may wish to consider it as a handy second or everyday camera.

The GM1 is one of the smallest compact system cameras available, and easily the smallest with a large (Four Thirds) sensor. Even the Nikon 1 system, which uses a much smaller (one-inch) sensor, has larger body sizes. What the Panasonic engineers have managed to achieve here is pretty remarkable.

Panasonic says that it will be marketing this camera primarily against premium compact cameras, such as the Sony RX100 II, the current best-seller in that market. The GM1 is smaller, even including the standard kit lens, than the RX100 II, which again is an outstanding achievement.

Other compact system cameras which could be seen as competitors to the GM1 are Olympus' PEN Mini E-PM2, Sony's NEX-3N and Panasonic's own GF6.

## FEATURES

The GM1 uses a 16-million-pixel Four Thirds sensor, the same that's found in the excellent GX7, which is much higher in the G series line-up. Supporting the sensor is a Venus processing engine, while other interesting features include a 1/16,000 shutter speed and silent



CSC Panasonic GM1 &gt; £529 with 12-32mm lens

> [www.panasonic.co.uk](http://www.panasonic.co.uk)

## Pocket rocket

**Amy Davies** discovers that Panasonic's GM1 is more than small and dainty

shooting, thanks to the camera's electronic shutter (compared to the usual mechanical). The GM1 also has built-in Wi-Fi and HD video recording at 60i. Its Wi-Fi connectivity enables you to shoot remotely and share images.

The camera is capable of shooting in raw format and gives you full manual control. There are also a number of automatic and scene modes, along with a large choice of digital filters.

Built from metal, the GM1 has a classic design. On the back of the camera is a three-inch, one-million-dot touchscreen, which is fixed. As you might expect, there is no viewfinder, and there is also no hotshoe or accessories port through which you could attach an external one. If you're looking for a camera which is relatively small but has the option to expand via accessories, you'll probably find that the GF6 would be a more appropriate option. Despite the camera's small size, there is a flash built in.

The GM1 is compatible with the extensive range of Micro Four Thirds lenses. Olympus compact system

**Above** The GM1 is a pocketable CSC, but unlike some teeny cameras, it doesn't skimp on image quality

cameras use the same mount, so all of its lenses are also compatible, as are those from third-party manufacturers such as Sigma.

## BUILD AND HANDLING

Before you can use the GM1, you'll need to rotate the zoom ring of the 12-32mm lens. This means that the camera isn't ready to shoot from switching on, but it does give the camera the advantage of collapsing down to a small size. If you're carrying the camera outside a pocket, you can always leave the lens extended when not in use.

Although the GM1 has a touchscreen, there's still a satisfying number of dials and buttons on the camera body itself, especially when you consider its small size. On top of the camera is a dial for switching between the various exposure modes on offer, including Aperture Priority and Shutter Priority. There's also a dial for switching between the focusing modes: single, continuous and manual.

There is no dedicated dial for altering shutter speed or aperture, but depending on the mode you're



The touchscreen is useful for setting the autofocus point



It's great to see a large Four Thirds sensor and Micro Four Thirds mount



If you're looking for an electronic viewfinder, you'll be disappointed



Those with large hands may find the small buttons a little cramped

## Zooming in on the... Panasonic GM1

A quick tour of the camera's key features



It's incredible that Panasonic has even managed to find room for a built-in flash on the GM1



Use this to alter aperture or shutter speed when in shooting mode, or to navigate through menus or images in playback



The handy quick menu is customisable which is helpful if you often find yourself changing the same setting



Use the touchscreen to quickly set the autofocus point or, if you prefer, tap Set and use the arrow keys



## "Images are full of detail, while colours are beautifully saturated without going over the top"

shooting in, you can make changes to these settings via the scrolling dial on the back of the camera.

Also found on the back, the three-inch touchscreen is joined by the traditional four-way navigational pad, a menu button, a playback button, a movie record button and a delete button. You can control most elements of the camera via the

touchscreen itself, but it's nice to have physical buttons to use as well for those who prefer it.

You can also use the touchscreen to set the autofocus point and, if you like, to fire off the shutter release. Both are convenient features when you need them, making the workflow of using the camera much quicker than cameras without a touchscreen.

One slight downside of the camera's small size is that it can be quite easy for a thumb to stray into the touchscreen area and accidentally make the odd change to settings.

A quick menu is available for

accessing commonly used settings, saving you having to dive into the full menu. Once in the quick menu, you can either use the physical arrow keys or the touchscreen – or even a combination of both. Handily, it's possible to customise the quick menu for settings you like to use often.

There is also a customisable function button on top of the camera. By default, this is set to access Wi-Fi functions, which seems like a sensible option. There are also virtual function buttons, which can be accessed via the touchscreen; these are customisable.

## PERFORMANCE

We had pretty high hopes for the GM1: it shares the same sensor as the GX7, which we know to be an excellent performer. Happily, we haven't been disappointed with what the GM1 is capable of. Images are full of detail, while colours are beautifully saturated without going over the top in the majority of conditions. Skin tones are also represented excellently.

The GM1's multi-zone (multi-purpose) metering system does a great job of producing balanced images, although in scenes with high contrast

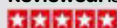
## Meet the rivals...

See how the Panasonic GM1 stands up against the competition



**Sony RX100 II**  
£569

A pocket powerhouse with a larger-than-average sensor and a wide-aperture lens. Updated since review  
**Reviewed:** issue 132



**Sony NEX-3N**  
£279

An APSC-size sensor and a tilting screen, but there's limited raw functionality and no hotshoe, so you may find this camera restricting.  
**Not reviewed**



**Olympus PEN E-PM2**  
£299

You get lots of bang for your buck with this model, including a collapsible lens and a great sensor  
**Reviewed:** issue 136

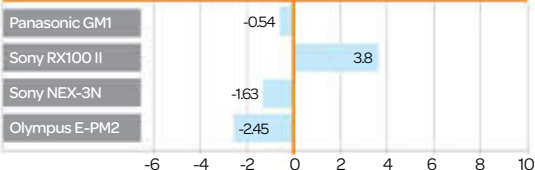




## SLR BENCHMARKS

How does the Panasonic GM1 fare?

## COLOUR ERROR Closest to zero is best



**COLOUR ERROR RESULT:** The GM1's colour error result is almost perfect – reflecting how accurate colours direct from the camera are.

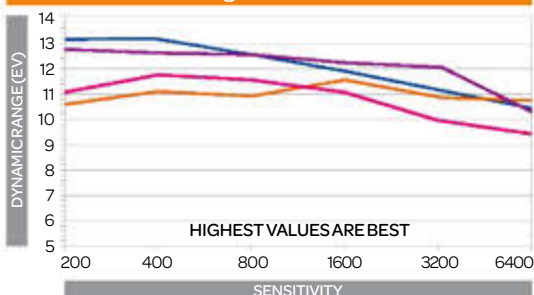
**KEY** Panasonic GM1 Sony NEX-3N  
Sony RX100 II Olympus PEN E-PM2

## RAW NOISE\* Highest values are best



**NOISE RESULT:** The GM1 is beaten by others, including the RX100 II at higher sensitivities, but this may indicate better detail resolution.

## RAW DYNAMIC RANGE\* Highest values are best

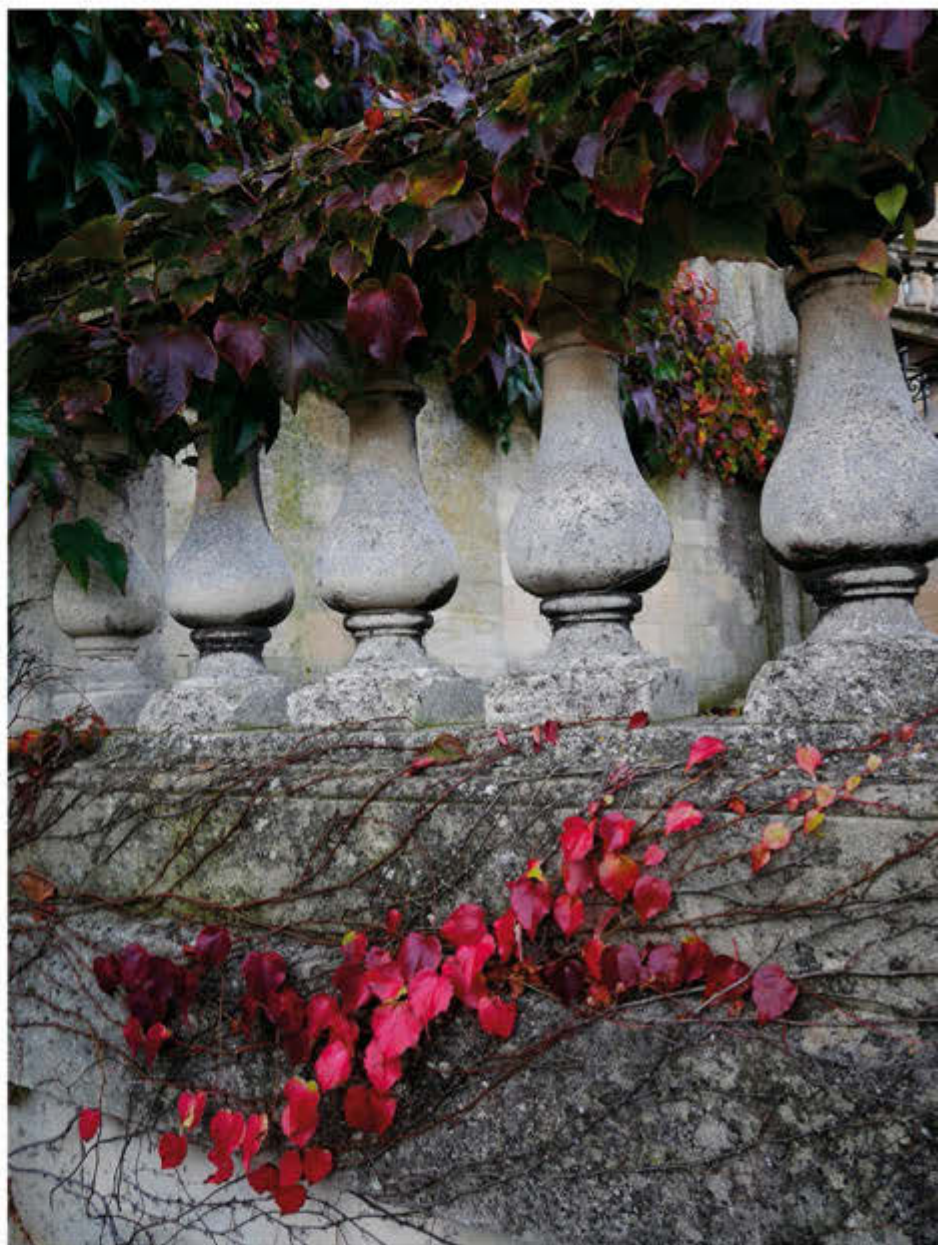


**DYNAMIC RESULT:** At almost every sensitivity, the GM1 is the winner here, with consistent results at the lower end of the scale.

## OVERALL BENCHMARK RESULT

Our labs data indicates that the GM1 competes closely with the GX7, with which it shares a sensor. It also competes closely with other CSCs in its category. For JPEGs, signal-to-noise ratio is slightly improved when compared with the raw format files\*, which may not be a problem for beginners working with JPEGs. For dynamic range, the GM1 is a more solid overall performer, closely matching or beating its rivals for the most part.

\* After conversion to TIFF



**WHAT'S THIS?**  
Find out how we test on page 6

**Above right**  
Colours are bright, punchy and well-saturated

orange-toned lighting. You have the option to choose a more specific white balance setting if it's proving to be particularly problematic, though.

Shooting at high sensitivities reveals the GM1 is capable in lower lighting conditions. Image smoothing is virtually non-existent at the lower end of the sensitivity scale, only starting to become noticeable from around ISO 800 or 1,600, depending on the lighting conditions. Images shot at ISO 3,200 remain usable, with noise and smoothing only really visible when examining an image closely at 100%. Generally, noise and noise are well balanced.

Autofocus speed is one of the key selling points of both Panasonic and Olympus Micro Four Thirds cameras. Once again, the GM1 delivers

in that respect, with near-instant autofocus. The speed drops slightly in low light, but not too badly, and generally focusing is accurate, with only a few instances of missed focus during our testing.

Shot-to-shot time is also good. Start-up time is quick, but if you're using the kit lens, you will need to extend it before you can use the camera, so bear that in mind. Speaking of the kit lens, the new 12-35mm optic is a good carry-around lens for everyday usage. It produces sharp images and by shooting at mid-range apertures, such as f/8, we can see that edge-to-edge sharpness is maintained pretty much right the way across the frame. It's also possible to create shallow-depth-of-field effects, despite the maximum

or extreme lighting conditions, you may find that you need to dial up or down the exposure compensation for better accuracy.

Similarly, the GM1's automatic white balance system does well to produce scenes with accurate colours. Under artificial lighting conditions, the tendency is for the camera to err towards warm tones, especially if you're shooting under yellow- or





aperture of the lens being f/3.5. Out-of-focus areas are rendered beautifully, with great bokeh effects.

You can attach other lenses from the Micro Four Thirds range, of course, but this is a camera Panasonic expects to be mainly used with the kit lens – some of the larger lenses may lead to some imbalance.

The downside of the GM1's kit lens when is that the maximum aperture is f/3.5, compared with f/1.8

**Above** Use digital filters to give your images a different look. This image was created with the Bleach Bypass Filter

**Below** When retracted, the lens is particularly small

for the lens provided with the RX100 II. Although this shouldn't have too much of an impact on depth of field with a larger sensor, it may mean you need to shoot at higher sensitivities in darker conditions. Investing in a pancake prime lens, such as the upcoming 15mm f/1.7 (yet to be released at time of writing) might be a good idea for such situations.

## VERDICT

It's impressive that Panasonic has managed to compress its excellent technology into a body as small as this. When you consider that this camera is smaller even than some of the Pentax Q cameras – which feature a compact-camera-sized sensor – the feat seems even more remarkable.

We'll be interested to see what kind of knock-on effect the GM1 has

## Tech Briefing

### Downsizing



Panasonic says that its engineers have downsized almost every component of the GM1 in order to produce a small body size; for instance, although the sensor itself is still a Four Thirds device, the overall sensor unit is around 30% smaller. The flash unit size has also been reduced by around 30%, while the shutter unit size has had a reduction of 80%. Overall, the body size is 40% smaller than the GX7, with which it shares a sensor.

Although the GM1 has built-in Wi-Fi, Panasonic has taken the decision not to include an NFC (Near Field Communication) chip, which can be found on the GX7 and allows for instantaneous connection with compatible devices, for space reasons.

In order to keep the overall size of the camera down, the new 12-35mm lens is also ultra-compact, and collapses down even smaller when not in use.

on sales of cameras such as the Sony RX100 II. With the package being smaller overall, but with the bonus flexibility of changing lenses and a larger sensor, we can see many people being swayed by the GM1.

We can see the GM1 appealing to a wide range of photographers, chiefly those who are after something which offers fantastic image quality without the bulk of something larger (even by Micro Four Thirds standards).

The Panasonic GM1 seems to be what the Micro Four Thirds range was intended for: making a fantastic addition to the already venerable G series line-up.

## Digital Camera

### FEATURES

★★★★★

### IMAGE QUALITY

★★★★★

### BUILD/HANDLING

★★★★★

### VALUE

★★★★★

## Overall ★★★★★

**WE SAY:** Move over, Nikon 1 and Pentax Q. Panasonic has made a fantastic small compact system camera, but managed to include a large sensor that produces excellent images.





## &gt; THE SPECS

Sensor	16MP Four Thirds Live MOS sensor (17x13mm)
Focal length conversion	2x
Memory	SD / SDHC / SDXC
Viewfinder	None
Video	Full HD (1,920x1,080)
ISO range	200–25,600 (expandable to ISO 100)
Autofocus points	23
Max burst rate	5.8fps
Screen	Tilting 1,040k-dot TFT LCD.
Shutter speeds	1/16,000–60 sec
Weight	266g (including battery and memory card)
Dimensions	107x65x33mm
Power supply	Li-ion battery pack (rechargeable, included)

**P**anasonic's GF series was traditionally its range aimed at novice photographers – but since the introduction of the GM series, the range has taken a little bit of a back seat. Now, however, Panasonic has refreshed the GF series with the GF7, which the company says is replacing the GF6. (Bargain hunters may like to note that the older model will continue to be on sale for a short while.)

## FEATURES

The pixel count of the GF7 remains the same as the GF6, at 16 million pixels, but the sensor and processor are upgraded to the ones found in the Panasonic GX7.

Panasonic claims that the autofocus system can operate in very low light, down to -4EV, but a Focus Peaking system is on hand, helping you see which areas are in focus, is on hand for those occasions when you need to focus manually.

The GF7 has a screen which can be flipped upwards through 180 degrees. Designed for taking selfies, the camera automatically switches to



**CSC** Panasonic GF7 > With 12–32mm f/3.5–5.6 kit lens: £429 / \$599 > [www.panasonic.com](http://www.panasonic.com)

## Selfie snapper

The GF7, Panasonic's latest starter CSC, offers a host of enticing features in a smaller, more retro body, says **Amy Davies**

selfie mode when the screen is flipped up. New options for selfies have also been included. In Face Shutter mode, the wave of a hand in front of a face will trigger the shutter, while Buddy Shutter mode is designed to help when taking selfies with friends.

Jump Snap mode, meanwhile, works by connecting the camera to a smartphone. You then put the



Above A good range of lenses is available from Panasonic, Olympus and other manufacturers.

phone in your pocket to detect when you're in mid-jump and trip the (tripod-mounted) camera shutter to take a shot.

## BUILD AND HANDLING

While the GF6 came supplied with a fairly large (by comparison) 14–42mm kit lens, the GF7 ships with the smaller, collapsible 12–32mm kit lens, which has previously been packaged with the GM range. This makes the camera smaller overall, while Panasonic has also given the GF7 a more classic, retro-inspired look.

Despite the fact that it's smaller than the GF6, the redesigned camera body feels a little more solid. For example, there's a more substantial thumb-pad on the back of the camera. Although the ridge texture that was on the front of the GF6 is now missing, the coating on the GF7 still gives some purchase.

## Meet the rivals...

The cameras taking on the Panasonic GF7



**Sony A5100**  
With 16–50mm lens:  
£479 / \$599  
A decent camera with good features. The Sony E Mount is also well-established.  
Reviewed: Issue 157  
★★★★★



**Panasonic GM5**  
With 12–32mm lens:  
£649 / \$899  
A capable CSC with a Four Thirds sensor, Wi-Fi and a bright viewfinder.  
Reviewed: issue 160  
★★★★★



**Nikon 1 J4**  
With 10–30mm lens:  
£359 / \$379  
Not the most exciting camera in the world, but image quality is good.  
Reviewed: issue 157  
★★★★★



The controls have had a little shift around since the GF6. On the top-plate, the mode dial moves from its position next to the pop-up flash to sit on the right-hand side, and there's also a new customisable Function button on the left.

Semi-automatic modes (such as Aperture Priority) are included on the mode dial, along with Panoramic mode, Scene mode, digital filters and a couple of other scene modes. The Automatic mode, however, is available via a separate dedicated button.

While there is now only one customisable physical button – which accesses Wi-Fi settings by default – there are a further six ‘virtual’ spaces on the touchscreen, which can also be customised; they’re useful if you find yourself wanting quick access to a given function.

Digital filters can either be accessed through a dedicated mode, or via the touchscreen while in

other exposure modes. As the lens is collapsible, you’ll need to extend it before you can shoot. This makes the process a little slower for the first picture you take, but you can leave the lens extended for the next shots.

## PERFORMANCE

Given that the sensor and processor have a proven track record, hopes were high for the GF7. Colours are bright and punchy direct from the camera, without so much vibrance that images appear unnatural.

Changing the Photo Style enables you to alter the look of your image, but not too drastically. You can choose from options such as Vivid, for instance, which is useful for boosting

“Colours are bright and punchy, without so much vibrance that images appear unnatural”

**WHAT'S THIS?**  
Find out how we test on page 6

# CSC TEST

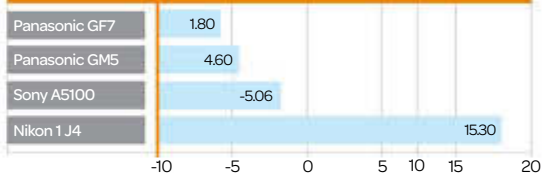
PANASONIC GF7

77

## SLR BENCHMARKS

How does the GF7 measure up?

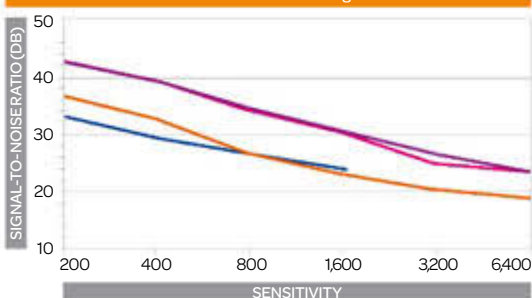
### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** The GF7 is the most accurate camera in this test. Its real-world shots show vibrance that is not over the top.

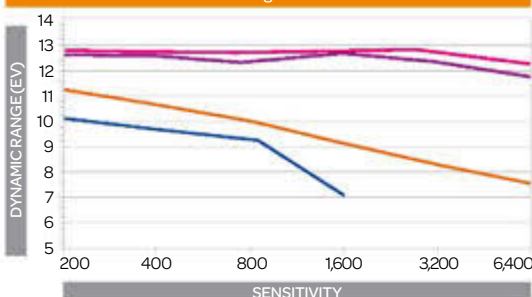


### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The GF7 and the GM5 are very close – not surprising given they share the same sensor and processor.

### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** Again, the GF7 and GM5 are almost identical, while both cameras easily beat the Sony A5100 and the Nikon J4.

## OVERALL BENCHMARK RESULT

As we expected it to, the GF7 performs very well. The Sony A5100 has a APS-C sized sensor, compared with the GF7's Four Thirds, so it's interesting to note the better performance of the smaller sensor. The GF7 also performs well when looking at the JPEG images, and not just the raw files.

\* Raw results use images converted to TIFF

Above Skin tones in particular are rendered nicely.

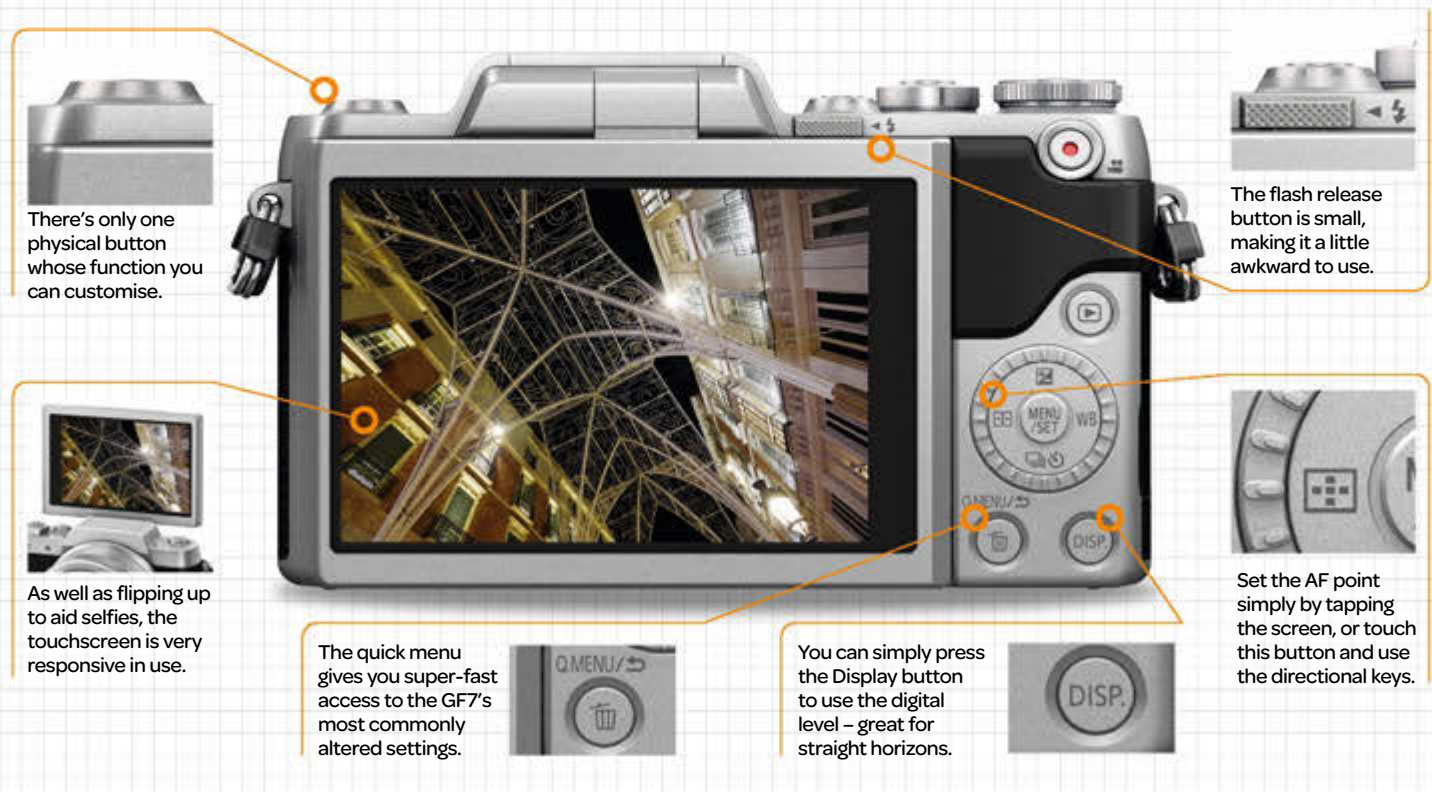
the hues in landscape shots. The good news is that you can use these in raw format, so you also have an unprocessed version of the image should you need it. The same can be said of the more dramatic digital filters, which you can apply in semi-automatic or Manual modes to keep full control of other camera settings.

The camera's sensor reproduces detail very well. By examining an image at 100%, we can see how much



## Zooming in on the... Panasonic GF7

Not much customisation, but well thought out



fine detail there is. As you move up the sensitivity scale towards higher values such as ISO 3,200, you can see some smoothing and loss of detail at 100%. The overall impression of detail at normal printing and web sizes is very good, though.

Generally speaking, both the all-purpose metering system and the automatic white balance system do a good job of producing accurate

**“It’s only really when you reach almost pitch-black conditions that the camera starts to struggle”**

**Below** The iA button is useful if you want the GF7 to take control.

exposures and colours. In low light, at high sensitivities, images are generally very good, with noise levels kept low even at sensitivity settings as high as ISO 3,200.

The supplied kit lens is a decent performer, but you might find it useful to purchase an additional lens with a longer focal length for holidays and travelling.

The GF7's autofocus speeds are very quick, especially in bright light, and it's only really when you reach almost pitch-black conditions that

the camera starts to struggle to lock on at all.

### VERDICT

Some may question the point of the GF range now that the GM range offers, in some respects, more functionality in a smaller package. But the GF series still offers a great range of features at a more affordable price.

Great for travelling, the GF7's flipping screen is ideal for selfies and perhaps appeals most to those who like to document their holiday visits, but the image sensor and processor can cope with varied conditions.



Digital Camera	
FEATURES	BUILD QUALITY
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** It's easy to recommend this camera to photographers in many fields. Travelling photographers looking for something light and hassle-free will particularly enjoy it, though.

# Photography week

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- Creative ideas, tips and must-try photo projects



<http://tiny.cc/613xkx>



<http://tiny.cc/6x3xkx>



<http://tiny.cc/bz3xkx>



## &gt; THE SPECS

Sensor	16.05MP Micro Four Thirds format (17.3x13.0mm)
Focal length conversion	2x
Memory	SD/SDHC/SDXC
Viewfinder	OLED electronic viewfinder (EVF) with 1,440,000 dots (approx 100% cover)
Video resolution	Full HD (1920x1080p)
ISO range	160-25600
Autofocus system	Contrast detection system with Face detection, AF Tracking, 23-area-focusing, 1-area-focusing, Pinpoint
Max burst rate	7fps
LCD screen	Vari-angle 3-inch 1,036,000-dot touchscreen
Weight	340g (body only)
Dimensions	122.45x84.6x71.4mm
Power supply	Rechargeable lithium ion battery (supplied)

CSC Panasonic Lumix DMC-G6 > £469 with 14-42mm lens > [www.panasonic.co.uk](http://www.panasonic.co.uk)

# The all-rounder

Panasonic's upgrades from the G5 may seem subtle, but they make a big difference. **Angela Nicholson** explains what's changed

**P**anasonic introduced the world's first compact system camera (CSC) back in September 2008 and the G6 is the fifth generation in the G-series of its Micro Four Thirds mirrorless line.

The new camera sits below the Panasonic GH3 in the company's CSC line-up and is aimed at enthusiast photographers who want to shoot a range of subjects with a lighter camera system than the average SLR kit. To this end, the G6 affords a similar level of control over images to an SLR and it has the usual exposure modes, including manual, aperture priority and shutter priority, as well as a collection of automatic options for less experienced photographers.

## FEATURES

Like their other CSCs, the G6 is built following the Micro Four Thirds standard, making it compatible with Olympus MFT lenses, and a growing collection from third party manufacturers such as Sigma, too.

Although Panasonic has stuck with the same 16.05 million effective pixel Live MOS sensor in the G6 that it used in the G5 (and GH2), it has used a new, more powerful Venus Engine, a better touchscreen and an improved electronic viewfinder (EVF).

According to the makers, the new processing engine enables the G6 to produce better quality images, and in turn enables a wider extended sensitivity range of ISO 160-25600 and faster autofocus, especially in

low light. In addition, the maximum continuous shooting speed is 7fps (frames per second), although you'll have to drop to 5fps if you want to use continuous AF mode.

Like the G5, the G6 has a collection of Creative Control modes accessed via the mode dial, with options such as Toy Camera and Impressive Art, as well as a number of Photo Styles (Standard, Natural, Monochrome, Vivid, Scenery, Portrait and Custom). Both can be used when shooting raw and JPEG images to save a clean file along with the JPEG with the effect applied, but it's not possible to control key features such as exposure when using the Creative Control options. The Photo Styles, however, can be used in any of the exposure modes apart from Creative Control.

Panasonic has also given the G6 Wi-Fi connectivity, and an NFC chip means it's possible to connect easily to other NFC devices such as an Android smartphone or tablet. As yet

**Above** The new features on the Panasonic G6 make it feel almost like a new camera rather than an upgrade

Apple hasn't included an NFC chip in its devices, but rumours are rife that one will feature in the iPhone 5S/6.

## BUILD AND HANDLING

The G6 looks and feels a little more serious than the G5. The silver controls of the older model are now black, the viewfinder bump is less pronounced and the texture of the body surface has changed. There are also a couple of additional function buttons, bringing the total number on the back of the camera to five. These enable greater customisation, making it quicker and easier to use the camera once you've set it to your preferences.

However, we were surprised to find that Panasonic hasn't continued with the customisable format of the Quick Menu. This is now fixed, which is a shame because the main menu doesn't have a customisable screen.

On the plus side, most of the options that you need to access regularly can be reached via physical

## Zooming in on the... G6

A quick tour of the camera's key features



A 1,440,000-dot OLED electronic viewfinder (EVF) is built-in



The screen is a very responsive and quick touch-sensitive device



While the Wi-Fi system is a bonus, it isn't intuitive to set-up



Unlike the G5, the G6's Quick Menu isn't user-customisable



There are five physical customisable buttons and two on-screen buttons, giving plenty of options to personalise the camera



Pressing this button in any shooting mode sets the G6 to Intelligent Auto mode instantly



Touch Shutter mode allows you to set the AF point and trip the shutter with just a touch of the screen

This Function Lever can be used to change focal length with a power-zoom lens, or to adjust the exposure



buttons or the Quick Menu, so you don't need to delve into the full menu very often once the camera is set up.

One issue we had with the G6's control arrangement was that we occasionally changed the on-screen display by accidentally pressing the Display button under the thumb-rest. We also initially found the navigation controls on the back of the camera a bit hard to identify when holding it to your eye. However, after a short time they become easier to locate.

While the G6's OLED 1,440,000-dot electronic viewfinder is excellent (the G5 has an LCD with the same

## "Panasonic's most complete and well-rounded enthusiast-level compact system camera to date"

dot-count), its faint grid-texture and contrast shift mean that you're aware you're using an EVF rather than an optical device. But it is very good and provides a very clear view, with lots of sharp detail and natural colours.

Another key upgrade made for the G6 is the switch to a 3-inch electrostatic touchscreen, which is much more sensitive than the

resistive touchscreen on the G5. This makes setting selection and adjustments quicker than before, putting the G6's screen's response on a par with the Panasonic GH3's.

It's especially useful when using Touchpad AF, which enables the AF point to be selected by touching the screen while composing images in the EVF. It's a significant improvement.

We found the screen also provides a clear view even in quite bright light, and because it is mounted on an articulating hinge, it makes shooting from awkward angles much easier than usual. It would be helpful if the on-screen digital level could be made a bit clearer, though, because it's not always easy to see it when the screen is being viewed from an angle.

## Meet the rivals...

See how the G6 stands up against the competition



### Sony NEX-6

£579 (with 16-50mm lens)  
An excellent 16.1MP APS-C format CSC with built-in Wi-Fi, but no viewfinder or touchscreen.

Reviewed: issue 134



### Olympus E-P5

£699 (with 14-42mm lens)  
This 16.1MP Micro Four Thirds sits at the top of the Pen range. It has no EVF built-in, but there's Wi-Fi.

Reviewed: issue 142



### Samsung NX300

£409 (with 20-50mm lens)  
This 20MP APS-C format CSC has a 3.1-inch AMOLED touchscreen and Wi-Fi, but no built-in EVF.

Reviewed: issue 143



## PERFORMANCE

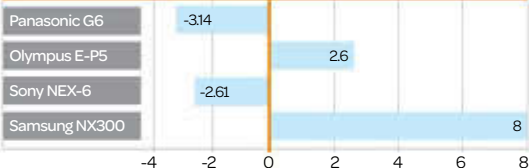
Our images from the G6 generally look very good. They're well exposed, have good, natural colours and plenty of detail. After testing the Canon 700D and 100D recently it was nice to use the Panasonic G6's 1728-zone Intelligent Multiple zone metering system, which gives more consistent results in high contrast situations.



## CSC BENCHMARKS

How the Panasonic G6 fared in our lab tests

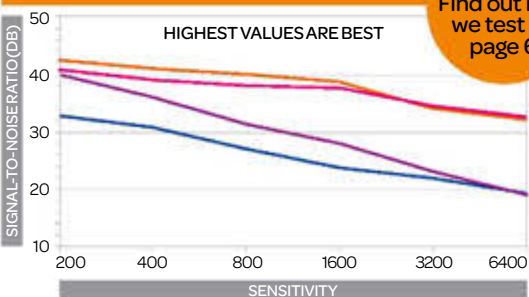
## COLOUR ERROR Closest to zero is best



**COLOUR ERROR RESULT:** The Panasonic G6's colour error score is respectably low, and images offer up some pretty nice saturation.

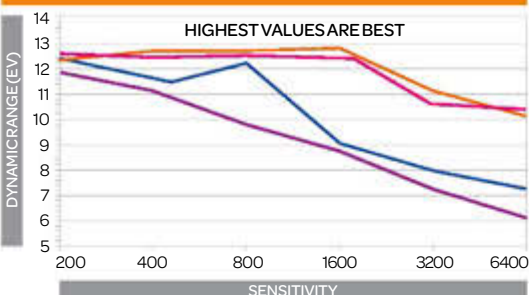
**KEY** Panasonic G6 (purple), Olympus E-P5 (pink), Sony NEX-6 (orange), Samsung NX300 (blue)

## RAW NOISE (AFTER CONVERSION TO TIFF)



**NOISE RESULT:** At the lower sensitivity settings the G6 performs very well, but it drops off a little as sensitivity rises.

## RAW DYNAMIC RANGE (AFTER CONVERSION TO TIFF)



**DYNAMIC RESULT:** A dynamic range above 11EV is good, but the competing cameras manage to go a little further.

## OVERALL BENCHMARK RESULT

These results confirm that the G6 competes well with the 20MP APS-C format Samsung NX300 for signal to noise ratio, but the 16.1MP Sony NEX-6 and Olympus E-P5 perform even better. The G6 performs well in normal conditions, capturing more detail than the NX300 at most sensitivity settings and keeping noise under control. Colours are also accurate, but vibrant and well-saturated without going too over the top.

Ⓛ In fact during this test we found little reason to use centre weighted or spot-metering, because the general-purpose multiple-zone system does so well. That said, it's not completely foolproof, and we occasionally had to adjust the exposure compensation – but it was usually only by 1/3EV.

Although the G6 lagged some way behind the Olympus PEN Lite E-PL5, PEN E-P5, and in some cases the Sony NEX-6 in our dynamic range lab tests,

**Above** This shot uses Impressive Art mode, one of the G6's Creative Control options



its images look natural, with a wide range of tones and smooth gradations. A dynamic range of around 10EV in JPEGs taken at up to ISO 800 is good, and the end result is images that have a good level of contrast.

Colours are also good straight from the camera, and the automatic white balance system copes well in most lighting conditions, only struggling in dim artificial light. While there's a range of preset white balance settings, it's so easy to set a custom white balance value that it makes sense to use this in artificial light.

Panasonic has used the same sensor in the G6 as it has in the G5. However, it has been able to eke out a little more detail from the G6's files, and it achieves higher resolution scores from ISO 800 and above.

Our JPEG images taken at ISO 1600 have lots of detail, with very little sign of noise and just a hint of smoothing visible at 100% on the screen. Pushing up to ISO 6400 increases the amount of smoothing that's visible at 100%, but images still look very good when sized to make A3 (16.5 x 11.7-inch) prints. Raw files can be processed to reveal more detail than the JPEGs, but this is at the expense of noise, which becomes more visible.

Panasonic supplies Silkipix Developer Studio software for raw conversion. While it's a good image-editing package, it isn't tailored to the camera in the same way that the software that comes with Canon and Nikon SLRs is. So you can't make in-camera-like changes to raw files.





However, in reality many G6 users are only likely to use the Silkipix software until the raw file conversion component of their favourite editing software has been updated, so it's not a major deal. G6 raw files editing is already supported by Photoshop CC, Elements 11 and Lightroom 5.

Panasonic's claims for the G6's AF system are borne out. As well as being fast and accurate it is better able to

**Above** The G6 handles colours well, and copes well with high contrast and varied lighting

**Below** The controls on the G6 are easy to find, but you can easily trigger some of them by mistake

focus in low light and follow moving subjects than its predecessor. It only struggles to find its target in very low lighting situations that would trouble any entry or enthusiast level SLR's phase detection AF system.

The AF Tracking mode still isn't able to keep up with subjects moving faster than walking pace. But if 1-Area AF and continuous AF mode is selected and you keep the active AF over the subject, it can focus the lens quickly and keep up with fast moving subjects. It may not be our first choice of camera for shooting sport and fast moving action, but it can still produce some great results.

## VERDICT

We liked the G5 because as well as producing high quality images, it had all the headline features we want from a modern compact system camera: a good built-in electronic viewfinder, a vari-angle touchscreen, the ability to shoot raw and JPEG images when using the Creative Controls, and a sensible control arrangement with some novel thinking.

So while Panasonic hasn't done anything so radical as increasing the pixel count of the sensor, the G6 has some good enhancements over the G5. The touchscreen is much more sensitive, which makes it faster and

## Tech Briefing Remote control app



Panasonic's new Image App is free to download, and it enables G6 users to control the camera remotely via their iPhone, iPad or Android device. Unlike some other apps which only act as a remote release, Image App gives the photographer remote control over the exposure, white balance and drive mode settings and the focus point can be set with the touch of a finger on the tablet or phone screen. It's especially useful for anyone who wants to be able to shoot while they are away from their camera, with a Live View image being displayed on the phone or tablet screen. Wildlife photographers, for example, can use the app to shoot their subject from a distance to avoid frightening off nervous creatures.

more inviting to use. The improved AF system also makes the camera a better alternative to an SLR, and more able to shoot moving subjects.

The G6 is the most complete and well-rounded enthusiast-level Panasonic compact system camera to date. It may lack the rugged build and a few of the features of the Panasonic GH3, but it's significantly smaller, too, making it a much more attractive option to carry around with you. It's also more affordable and very capable, capturing high-quality images with plenty of sharp detail at the lower sensitivity settings.

Using the Wi-Fi connectivity isn't quite as slick an experience as we'd like, but the additional functionality is useful – and fun.



Digital Camera	
FEATURES	BUILD/HANDLING
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** Panasonic has produced its best enthusiast-level CSC to date. With a viewfinder, articulating touchscreen, lots of physical controls and Wi-Fi connectivity it has just about everything you could want.



## &gt; THE SPECS

Sensor	16.05MP Micro Four Thirds format (17.3x13mm)
Focal length conversion	2x
Memory	SD/SDHC/SDXC
Viewfinder	OLED Electronic viewfinder (EVF) with 2,359,000 dots (approx 100% cover)
Video resolution	4K (4,096x2,160) and Full HD (1,920x1,080p)
ISO range	200-25,600; expandable to 100-25,600
Autofocus points	49
Max burst rate	12fps Single AF, 7.5fps Continuous AF
LCD screen size	3-inch; 1,036,000 dots
Shutter speeds	1/8,000-60 sec plus Bulb to 60 mins
Weight	480g (body only)
Dimensions	132.9x93.4x83.9mm
Power supply	Li-ion battery (included)



CSC Panasonic Lumix DMC-GH4 > £1,199 / \$1,698 (body only) > [www.panasonic.co.uk](http://www.panasonic.co.uk)

# 4K lightning

It may look like the GH3, but the GH4 is a serious upgrade with 4K video and better images. **Angela Nicholson** investigates

**W**hile the Panasonic GH3 is widely regarded as a great compact system camera for shooting video, its stills

capability has been rather overlooked. Panasonic is hoping that the GH4 will gain more respect as a stills camera –but its headline specification is its ability to shoot Ultra High Definition 4K (4,096x2,160-pixel) video.

Panasonic has clearly invested a lot of time and effort in improving on the GH3 for the GH4, and the new camera has an extensive list of new or enhanced features. However, some may be surprised to learn that the sensor's pixel count has stayed the same at 16.05 million, even though the sensor is completely new. Outwardly, the GH4 also looks almost identical to the GH3 and has a very similar arrangement of controls.

## FEATURES

Panasonic is keen to point out that any improvements made to allow 4K video recording also have a beneficial impact on still image quality. For example, because 4K recording is so demanding in processor power, the new 16.05-million-pixel Digital Live MOS sensor is coupled with the

Venus Engine IX processor (the Panasonic GX7 has the Venus Engine VIII; the GH3 has the VII version), which is a quad-core processor. In addition, the sensor has twice the read-out speed of the GH3, reaching 200Mbps. This should mean improved autofocussing (AF) speeds and better noise control.

Clearly the company is confident of the GH4's noise control: sensitivity may be set in the native range of ISO 200-25,600, with ISO 100 as an expansion setting. In comparison, the GH3 has a range of ISO 200-12,800,

**Above** The GH4's weatherproof seals mean you can use it in all conditions

with expansion settings of ISO 125 and ISO 12,800-25,600.

Thanks to the new processor, the GH4 can shoot continuously at up to 12fps (frames per second) in Single-AF mode with a UHS-III SD Card installed. This rate drops to 7.5fps in continuous autofocus mode.

Further refinements on the GH3 include an increase in the number of selectable AF points from 23 to 49, focus peaking to help manual focussing, and zebra display to indicate highlights that are close to burning out.



## Stick or twist? Upgrade advice

The GH3 (left) was a big hit with keen videographers who wanted a small, high-quality camera. The addition of 4K capability makes the GH4 a desirable upgrade for videographers. Zebra display and focus peaking were widely requested for the upgrade, and

the GH4 delivers both. It also brings an improved processing engine, faster autofocussing and a wider sensitivity range. However, GH3 owners who primarily shoot stills may be disappointed that the sensor's pixel count remains the same.

## BUILD AND HANDLING

There are only a few noticeable differences in the appearance of the GH4 in comparison with the GH3. They are closely matched in size and weight, and have an almost identical control layout. However, the eye-cup around the electronic viewfinder is slightly larger on the GH4 to offer a little more shade from strong

## Zooming in on the... Panasonic Lumix GH4

A quick tour of the camera's key features



This central button can lock the mode dial to prevent it from being knocked off the selected camera mode



You can change quickly between Single-AF, Continuous-AF and Manual Focus with a simple flick of this switch



These buttons give a direct route to three of the most common image parameters



Customise the Quick Menu for a quick route to your most-used settings



This port links the GH4 to the optional Interface Unit, which adds lots of connection options

The GH4 has built-in Wi-Fi and NFC for wireless control and image transfer facilities



sunlight. There's also a lock button at the centre of the mode dial to prevent it from being knocked out of position. This lock is our preferred type, which clicks to lock or unlock that so the button doesn't need to be held down when rotating the dial.

As before, the GH4 has a magnesium alloy body that is dust- and splash-proof, and it has the same solid feel as the camera it replaces. But Panasonic has bolstered the GH4's durability by giving its shutter a life-span of 200,000 cycles, double that of the GH3.

**"The GH4 produces great-looking images with pleasing contrast, natural colours and lots of detail"**

Like the electronic viewfinder, the 3-inch LCD rear display offers a very clear view, thanks to its 1,036k-dot resolution. Images look great on it, as there's a very pleasing level of contrast. It's also very responsive to the touch, making it a convenient way of selecting AF point and other setting options.

## PERFORMANCE

As a general rule, the GH4 produces great looking images with good exposure, pleasing contrast, natural colours and lots of detail. Zooming in to 100% on-screen reveals that some JPEG images don't have quite the fine detail or micro-contrast that we see from other cameras, but they look great at sensible viewing sizes.

As is often the case, the GH4's simultaneously captured raw files have more detail. At higher sensitivity settings they also have more noise, but this can be dealt with on an image-by-image basis to produce a good result.

Noise is controlled well throughout the sensitivity range, but detail isn't maintained quite as well as in the Fujifilm X-T1, for example, at higher sensitivity settings.

At 100% on-screen, JPEGs look good up to around ISO 3,200. Above this figure, softening becomes more apparent. Raw files have chroma noise visible at 100% from around ISO 800, but it's within acceptable limits, and as we've mentioned before, can be subjected to reduction as required.

## Meet the rivals...

See how the Lumix GH4 stands up against the competition



**Fujifilm XT-1**  
£949 / \$1,200

An SLR-styled CSC with retro controls and a 16.3-megapixel APS-C size X-Trans CMOS II sensor.

Reviewed: issue 151



**Olympus OM-D E-M1**  
£949 / \$1,299

Olympus's top-end Micro Four Thirds CSC, with bags of customisation options and a tilting touch-screen.

Reviewed: issue 146



**Canon EOS 70D**  
£815 / \$1,000

A 20.2MP SLR with a vari-angle touchscreen and built-in Wi-Fi connectivity.

Reviewed: issue 140

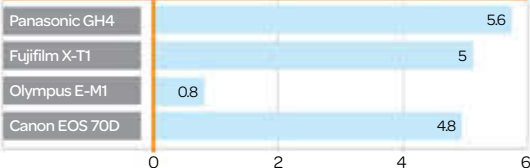




## CAMERA BENCHMARKS

How does the Panasonic GH4 measure up?

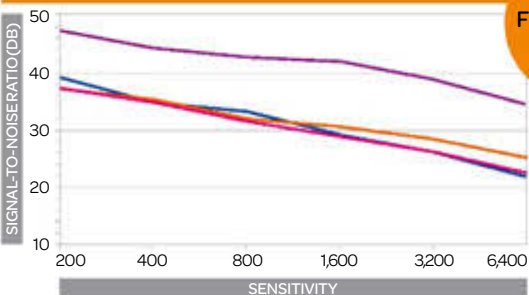
## COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** It's not the most accurate for colour, but images look very good and have pleasant saturation and contrast.

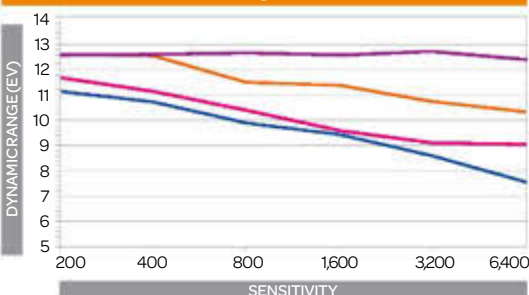
**KEY** Panasonic GH4 (purple), Fujifilm X-T1 (pink), Olympus OM-D E-M1 (orange), Canon EOS 70D (blue)

## RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The GH4 leads, indicating that its images are the cleanest from noise, but its detail resolution can't match the X-T1.

## RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** Another very impressive performance from the GH4, showing that its raw files have a wide tonal range.

## OVERALL BENCHMARK RESULT

It's clear that the GH4 makes a significant step forward in image quality on the GH3: the raw file\* signal-to-noise ratios and dynamic range are much improved. Although its signal-to-noise ratio is high at upper sensitivity settings, its ability to resolve detail isn't as good as in some competing cameras.

\* Raw results use images converted to TIFF

**WHAT'S THIS?**  
Find out how we test on page 6



to focus with the new Leica DG Noctronic 42.5mm f/1.2 ASPH OIS in dim conditions, but this is a super-fast lens with a price to match.

Panasonic's 12-35mm f/2.8 lens, which gives a focal length range equivalent to the popular 24-70mm on a full-frame camera, also delivers sharp subjects quickly, but we found the new 14-140mm f/3.5-5.6 kit lens a little more variable – especially at the telephoto end.

In good light, the AF system is generally very fast and it can keep pace with moving subjects when the AF point is in the correct location. Tracking AF mode has also improved, but it can't be relied upon to follow a fast moving subject around the frame.

The autofocus system changes pace when movies are being recorded. A touch of the screen to change focus point sees the focus shift smoothly and comparatively slowly, creating a professional-looking result.

Panasonic's metering and white

balance systems have been found to be good performers in the past, and the GH4 doesn't disappoint in either respect. The camera's automatic white balance system produces convincing results in a wide range of lighting conditions. In natural light, the results you get when shooting using the Automatic setting are often indistinguishable from those taken using the Daylight setting.

Although the GH4 has the usual trio of metering modes (Multiple, Centre-weighted and Spot), we found that the general-purpose 1,728-zone multi-pattern metering delivers great results in most situations. There were relatively few occasions when we had to use the exposure compensation facility to adjust exposure.

As usual, the GH4 is supplied with ISL's Silkypix software for editing images and converting raw files. In reality, few GH4 owners are likely to use Silkypix in preference to Adobe's more refined and better-specified

By ISO 12,800, however, raw files need careful editing to conceal noise and preserve detail. ISO 25,600 gives respectable results but, as is often the case, is best kept for emergencies.

Panasonic claims that the GH4's autofocus system can operate down to an incredible -4EV. Our testing indicates that with the right lens, it is quite a bit better in low light than previous G-series cameras. We were impressed by how quickly it was able

**Above left** The 2x focal-length magnification factor is useful with nervous subjects



options: Photoshop CC, Lightroom 5 or Elements 12. Silkipix has most of the controls you need, but it isn't especially intuitive or pleasant to use. Adobe's recent update to its Camera Raw plug-in (version 8.5) makes GH4

**Above** The GH4's AF system found this scene, taken with the 14-140mm lens, challenging

raw file processing possible with the Photoshop family.

We haven't been able to test the GH4's video capability extensively, but it's clear that it produces high-quality footage. As with the camera's still images, exposure, white balance and colour all look good, and there's plenty of detail visible.

## VERDICT

As Panasonic has stuck with the same pixel count as the GH3 for the GH4, it doesn't make really significant strides with detail resolution, but the images do look a little nicer straight from the camera, and noise is better controlled. The GH4 also takes a step forward in autofocussing; it's fast and accurate in most situations and can focus on subjects in pretty low light.

Somehow, holding the GH4 doesn't instil the same level of excitement as picking up the Olympus E-M10 or one of Fujifilm's X-series CSCs, but it combines all the modern technologies that we like:

a high-resolution electronic viewfinder; a vari-angle screen that's touch-sensitive; the ability to shoot raw and JPEG images when using Creative Control filter effects; and Wi-Fi connectivity that allows the camera to be controlled remotely.

Perhaps the lack of excitement is largely because the GH4 has a modern SLR-like design rather than the retro-styling of the Olympus and Fujifilm cameras. Nevertheless, the GH4 is an excellent camera that encourages creativity and is weather- and dust-proof, so it can be used in a wide range of conditions.

**Below** There's a good, deep grip on the GH4 body



Digital Camera	
FEATURES	BUILD/HANDLING
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** The GH4 has some of our most sought-after features: a high-resolution EVF, a vari-angle screen that's touch-sensitive and Wi-Fi connectivity. It's also weather- and dust-proof and takes great-looking images.

From the makers of **Digital Camera** magazine



## &gt; THE SPECS

Sensor	20.4 million pixel APS-C sized CMOS sensor (23.5 x 15.6mm)
Focal length conversion	1.5x
Memory	SD/SDHC/SDXC
Viewfinder	Pentaprism 100% viewfinder, 0.95x magnification
Video	Full HD (1,920 x 1,080)
ISO range	100–51,200
Autofocus points	11 (9 cross-type focus points in the centre)
Max Burst Rate	5.4fps
Screen	3-inch, TFT colour LCD monitor
Shutter speeds	1/6,000–30 sec
Weight	558g (including battery and memory card)
Dimensions	93 x 120 x 70mm
Power supply	D-LI109 Li-ion battery



SLR Pentax K-S1 &gt; With 18–55mm lens: £439 / \$649

> [www.ricoh-imaging.com](http://www.ricoh-imaging.com)

# Flashy number

Different colours, flashing lights: are all the gimmicks of the Pentax K-S1 hiding a decent camera? **Amy Davies** finds out

**D**espite the fact that Pentax does indeed make some very good digital SLRs, it generally always plays second

fiddle to the big names of Canon and Nikon. It's possibly for this reason that in recent years, the company has tended towards gimmicks to try and shift units.

Take the K-S1. It's available in an array of bewildering colours, including a new Sweets collection. There's also a panel of lights on the front of the camera, which are supposedly designed to guide operations.

## FEATURES

Ignoring the aesthetics, at its heart, the K-S1 actually has some very decent specifications and interesting technologies – especially for an amateur-level camera. At its heart is a 20-million-pixel CMOS sensor with a sensor-based shake reduction system. In principle, this will provide an image-stabilising effect with any lens you choose to fit. This system is also used for the Pentax's distinctive Anti-Alias Simulation modes.

The sensor itself has no anti-aliasing filter, which means slightly sharper fine detail but the risk (rare

in practice) of moiré or interference effects appearing in image areas with very fine patterns and textures.

The K-S1 can shoot continuously at 5.4 frames per second and it has a maximum shutter speed of 1/6,000 second. It has a proper pentaprism viewfinder, with 100% coverage. The camera also offers a selection of effects modes and a large array of digital filters; you can use these as you shoot, or apply them later.

There are 11 autofocus points, of which the nine in the centre are the



**Above** The green button resets whatever function is being adjusted; if it's ISO, it sets it to Auto.

more sensitive cross-type points.

On the back of the camera is a 3-inch TFT LCD monitor, with a 921k-dot resolution. There's no tilt mechanism for adjusting the screen angle.

You can shoot in raw format. One particularly useful factor in Pentax cameras is that its raw format of choice is DNG, rather than a proprietary camera or manufacturer format. This means that your software, whether it's Photoshop or an alternative, should already be able to read the files it outputs rather than having to wait for an upgrade.

There's no built-in Wi-Fi connectivity in the K-S1, despite the feature becoming more and more common in other cameras. There's just one memory card slot, for SD/SDHC/SDXC cards, and you'd need a second before a third-party Wi-Fi card became a realistic option.

As Pentax has been making SLRs for quite some time, there's a huge



## Stick or twist? Upgrade advice

If you're looking for your first digital SLR, the K-S1 is a decent option if you're keen to avoid the big names of Canon and Nikon for whatever reason. If you've already got some Pentax gear, perhaps from the film days, it should also be pretty appealing,

especially as the kit lens really isn't up to scratch.

If you're not already tied to a particular brand, though, you should take a look at the equivalent Canon and Nikon SLR models for a better overall shooting experience.

## Zooming in on the... Pentax K-S1

Some quirky design helps this camera stand out



Activate Live View shooting by tapping this button, just next to the viewfinder.



The colourful rear display makes it quick and easy to see which settings are selected.



The viewfinder offers 100% coverage of your scene, which is unusual for an entry-level camera.



Use the dial on top of the camera for altering shutter speed or aperture, depending on which shooting mode you're in.



The shooting mode dial is on the back of the K-S1 – one of a few design choices that set it apart.

Hold down the OK button to switch between using the directional keys for their dedicated function or for setting the AF point.



range of lenses available, so those who had an old Pentax film camera and a collection of glass might be tempted by this digital model.

### BUILD AND HANDLING

The K-S1 has quite a boxy and utilitarian look to it, with squared off edges, compared with the rounder, softer edges you might find on a Canon or Nikon SLR. There's a pretty

“In a design choice that is likely to divide opinion, there's a strip of lights built into the grip”

hefty grip on the right-hand side of the camera, but our fingers didn't sit all that comfortably on it. There's also no recess where your forefinger might sit a bit more flush with the camera.

In a design choice that is likely to divide opinion, there's a strip of lights built into the grip of the camera, which illuminates when the camera is first switched on. If you're using the self-timer mode, the strip will flash in different sections to indicate when the shutter is about to be released.

A light also encircles the shutter release button and pulsates slowly when the camera is on but not currently being used, or is on constantly when the camera is active. If you switch to video record mode, the light will turn red.

A fairly large dial on the top of the camera can be used to alter the aperture or shutter speed, depending on the shooting mode that you're in. This dial is easily reached with your thumb and is stiff enough to not accidentally slip out of place while you're shooting, but not too stiff to be difficult to turn. You also use this dial to adjust exposure compensation

### Meet the rivals...

The cameras taking on the Pentax K-S1



**Nikon D3300**  
Price with 18–55mm lens: £400 / \$499

An excellent choice as a first digital SLR: lots of detail, and quality images.

Reviewed: page 46  
★★★★★



**Canon EOS 700D**  
Price with 18–55mm lens: £539

A capable camera that produces quality images and affords lots of control.

Reviewed: issue 140  
★★★★★



**Panasonic G6**  
Price with 18–55mm lens: £399

A well-rounded CSC that features just about everything you'd want.

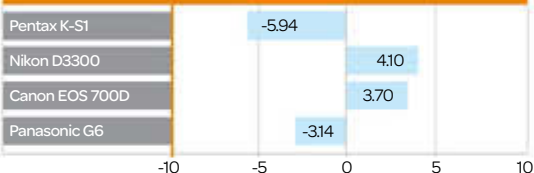
Reviewed: page 80  
★★★★★



## CAMERA BENCHMARKS

How does the K-S1 fare against its rivals?

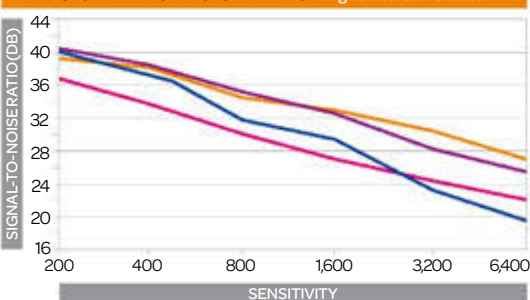
## COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** The K-S1 produces the least accurate colours in the lab, but real-world results are pleasant enough.

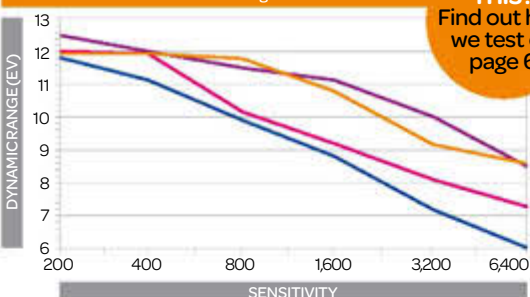
**KEY** Pentax K-S1 (purple), Nikon D3300 (pink), Canon EOS 700D (orange), Panasonic G6 (blue)

## RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** Another impressive result here. This time the noise result matches closely with that of the Canon EOS 700D.

## RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** The K-S1 has an impressive dynamic range, matching closely with the Panasonic G6.

**WHAT'S THIS?**  
Find out how we test on page 6

## OVERALL BENCHMARK RESULT

When looking at JPEG images, the camera is slightly less impressive – which is a shame considering that most beginner users will work with these files rather than raw-format files. For dynamic range, the K-S1 sits somewhere in the middle of the group, while for noise reduction it fares a little better, coming second in the group after the Panasonic G6.

\* Raw results use images converted to TIFF



functions. This approach can make it a bit of a slow process when you want to quickly change a setting, but it's something you soon get used to.

As the four directional buttons and the OK button sit fairly flush to the camera, they're not easy to navigate by touch alone, for example when you're holding the camera up to your eye to shoot.

Just behind the lens mount is a switch for moving between manual focus and automatic focus. It's a fairly loose dial, so it is reasonably easy to accidentally knock it out of place while the camera's in a bag or something. This can leave you wondering why it's not focusing.

Sadly, the kit lens for the K-S1, an

18–55mm f/3.5–5.6 zoom, is a real let-down. Both Canon and Nikon have super-smooth, near-silent AF motors built into their lenses, but this one is driven by a focusing screw in the lens mount. It's quick enough, but it's coarse and noisy, and will hunt and hesitate in some situations.

## PERFORMANCE

Colours in JPEG images direct from the camera are bright and punchy, showing a nice level of saturation without being unrealistic. Comparing colours in the raw-format DNG files shows a more muted palette, which gives you good scope for working with the files to get exactly the look you need. Meanwhile, the camera's 20-megapixel sensor is capable of resolving a good amount of fine detail, probably a result of not having an anti-aliasing filter.

Other Pentax cameras we have tested have suffered a little from

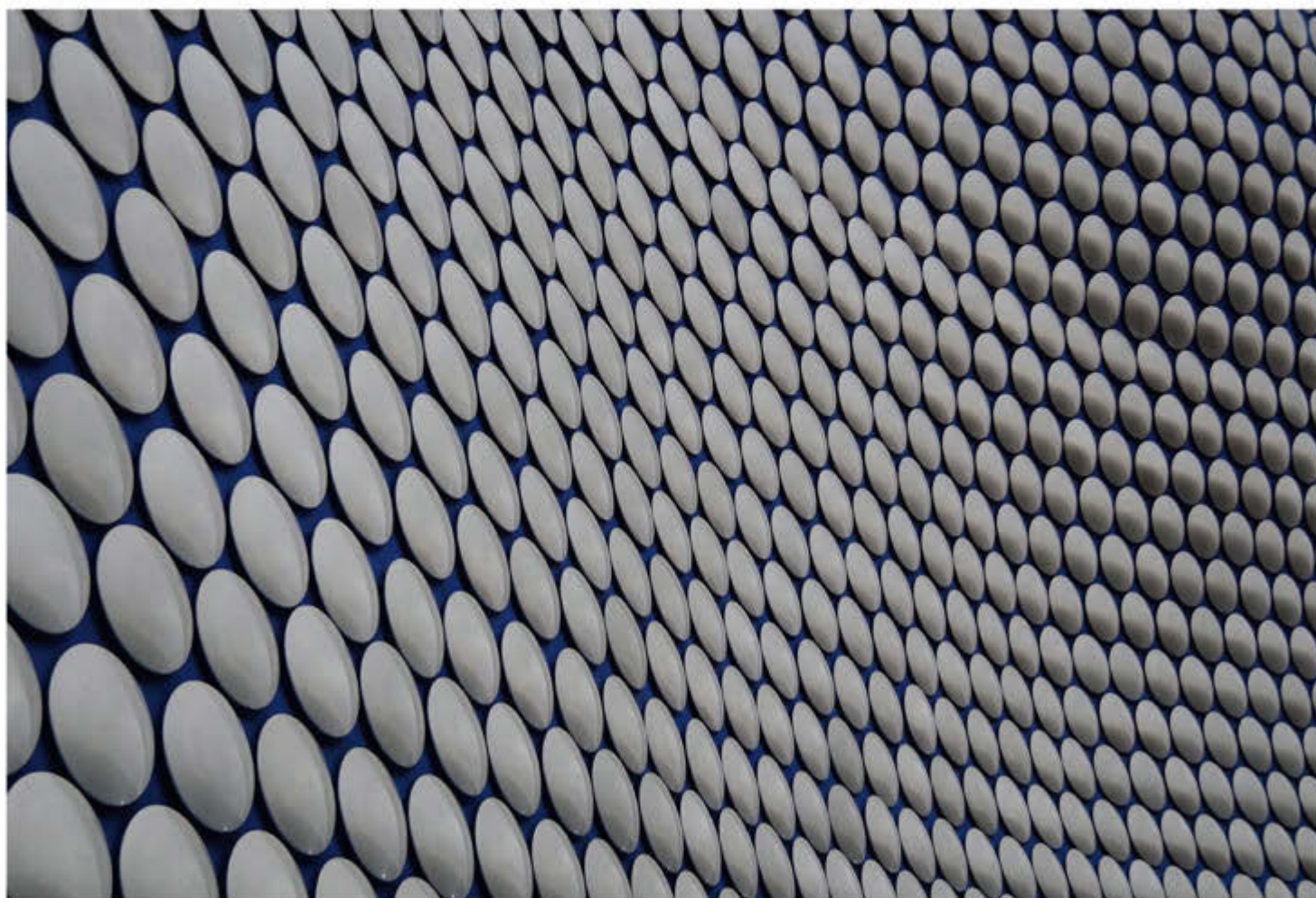
**Above** Colours have pleasant saturation and fairly natural tones in the default settings

**“The camera's 20-megapixel sensor is capable of resolving a good amount of fine detail”**

❶ after you've pressed the exposure compensation button.

Each of the directional keys also gives you access to a dedicated function, such as ISO (up) and white balance (down). In the middle of the navigational pad is a large OK button, which – you guessed it – lights up. Hold this down to switch between using the directional keys to set the autofocus point, and using the directional keys for their dedicated





underexposure in some conditions, but the K-S1 performs a lot better in this area, providing well-exposed images in a variety of situations. If it's

**Above** There are plenty of lenses for the K-S1's K mount; it's a good idea to ditch the kit lens if you can. This was taken with an 18-135mm lens.

a very high-contrast scene, however, you may still need to dial in some exposure compensation.


The automatic white balance system does a pretty good job in most conditions, providing accurate colours directly from the camera. It errs ever so slightly towards yellow and orange tones under artificial lighting in our test images, but if you're finding this to be a problem, you can simply switch to a more appropriate white balance preset.

Images taken in low light at high sensitivity display a good level of noise control. Right up to around ISO 3,200, picture noise is barely visible at all, even you're examining an image at 100%. Even at ISO 6,400, there's barely any noise apparent, and at normal printing and web sizes (such as A4 or below) the overall impression of detail is excellent.

## VERDICT

Overall, this camera is a decent purchase for people who are looking for their first digital SLR. Some will undoubtedly be put off by the design

choices on offer here from Pentax, principally the liberal use of status lights, while others will welcome them. If you buy from a camera shop, you can handle the camera first to see what you think.

Factor in some budget for replacing the kit lens and you'll no doubt be pretty happy with the camera. But if your budget is inflexible, you're probably better looking at the similarly priced alternatives from Canon or Nikon, which come with much better kit lenses. 



**Left** The K-S1 body has a rather angular shape that will have its lovers and detractors.

Digital Camera	
FEATURES	BUILD QUALITY
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** The K-S1 is a decent choice for those looking for their first digital SLR, but it's even more enticing if you already have some Pentax gear – especially a lens or two to replace the duff kit lens.



## &gt; THE SPECS

<b>Sensor</b>	20.5MP one-inch CMOS sensor (13.2 x 8.8mm)
<b>Focal length conversion</b>	2.7x
<b>Memory</b>	Micro SD / Micro SDXC / Micro SDHC
<b>Viewfinder</b>	None
<b>Video</b>	1080p
<b>ISO range</b>	160 to 12,800
<b>Autofocus points</b>	21 in normal mode; 35 in close-up mode
<b>Max burst rate</b>	Up to 6fps
<b>Screen</b>	Three-inch, 460k-dot, TFT touchscreen LCD
<b>Shutter speeds</b>	1/6,000 – 30 sec plus Bulb
<b>Weight</b>	196g
<b>Dimensions</b>	110.4 x 61.9 x 22.5mm
<b>Power supply</b>	B740AE rechargeable lithium-ion battery (supplied)



**CSC** Samsung Mini NX with 9mm lens > £269 / \$380 > [www.samsung.com](http://www.samsung.com)

# Small system

With a brand-new mount as well as a new sensor size, is Samsung's NX mini worth taking a chance on? **Amy Davies** finds out

**W**hile many compact system cameras are the natural competitor for the hefty SLR, there are other, smaller systems

that find their competition more readily within the compact arena. To produce the ultra-small NX mini, Samsung has used a 20.5-million-pixel one-inch type sensor – the same physical size as found in the Nikon 1 range of CSCs and the Sony RX100 fixed-lens compact cameras.

A new sensor size means a new mount, and therefore a new range of lenses. So far, there are just three such optics available to buy: a kit zoom lens, with a focal range of 9-27mm (roughly equivalent to 24-72mm in 35mm terms); a 9mm f/3.5 pancake lens (24mm equivalent); and a 17mm f/1.8 lens (45mm equivalent).

## FEATURES

Samsung is aiming this camera at a beginner audience, but you can take manual and semi-automatic control of the NX Mini. It can also shoot in raw format.

The camera's screen rotates through 180 degrees, making it particularly useful for taking self-portraits, but also for coping with other awkward angles. It doesn't tilt downwards, so you won't be able to use it for overhead shots. The screen is touch-sensitive, though.

Unsurprisingly for something so small, there's no built-in viewfinder.

**Above** Samsung's pulled out all the stops to make a tiny swappable-lens system, in the form of the NX mini

There is Wi-Fi and NFC connectivity, though, and to keep the size down, Micro SD Cards are used.

## BUILD AND HANDLING

If you're using the NX mini with the 9mm pancake lens, you'd be forgiven for thinking it was an ordinary compact camera. It looks a little less balanced with the 9-27mm zoom lens, even though the lens collapses into itself to make it smaller.

Despite its small size, and the fact that it offers a touchscreen, there's still a decent number of buttons to

## Meet the rivals...

See how the NX mini stands up against the competition



**Panasonic GM1**  
With 12-32mm lens:  
£549 / \$709

This small CSC still manages to fit in a good, large image sensor.  
**Reviewed: page 72**  
★★★★★



**Nikon S1**  
With 11-27.5mm lens:  
£229 / \$349

With good image quality but a few usability niggles, the S1 is the smallest CSC Nikon makes.  
**Not reviewed**

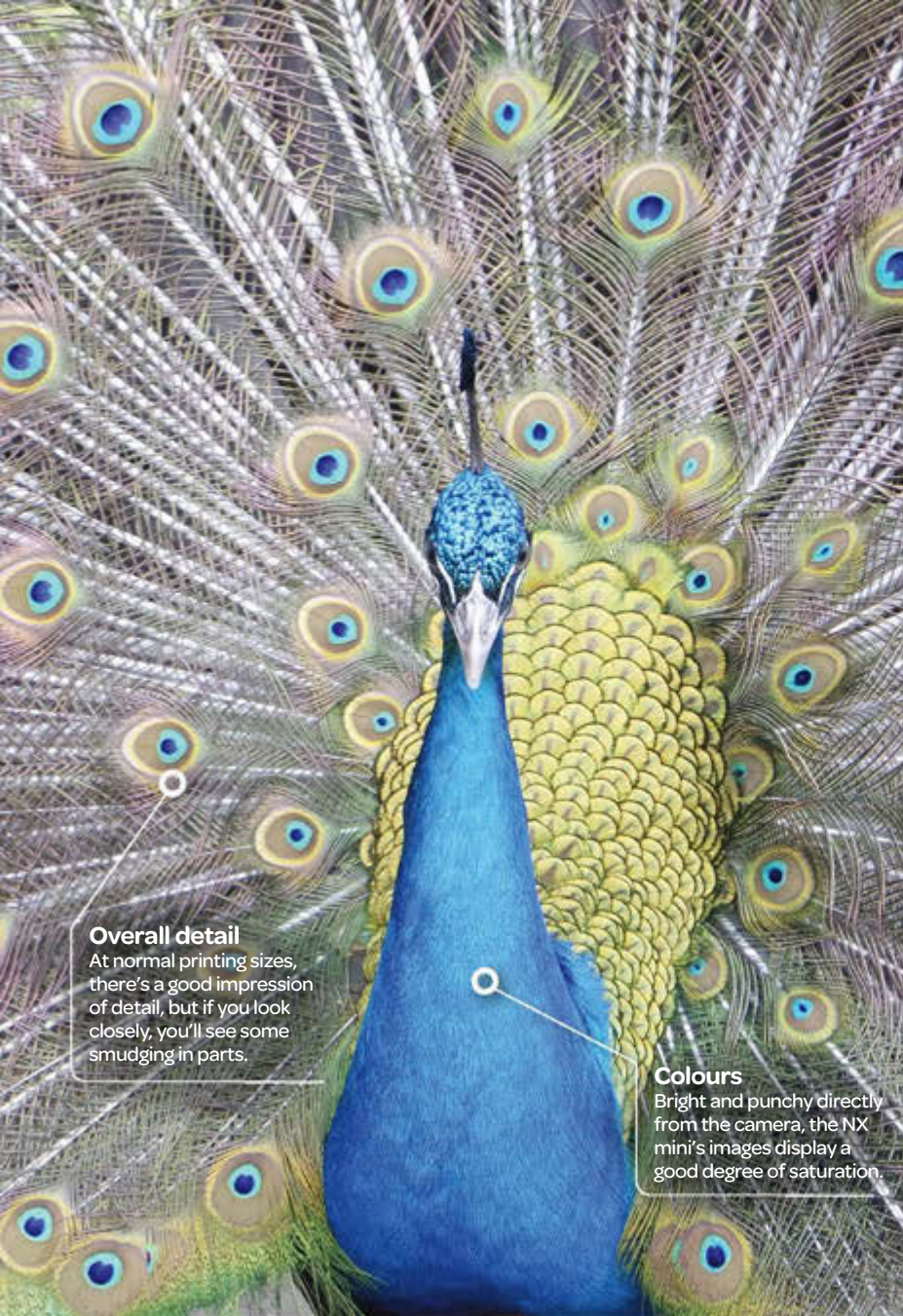


**Sony RX100 III**  
£699 / \$798

A compact camera with a fixed 24-70mm lens, the RX100 III manages to squeeze in a high-res electronic viewfinder.  
**Not reviewed**

“A new sensor size in the NX mini means a new mount, and therefore a new range of lenses”





#### Overall detail

At normal printing sizes, there's a good impression of detail, but if you look closely, you'll see some smudging in parts.

#### Colours

Bright and punchy directly from the camera, the NX mini's images display a good degree of saturation.

be found on the NX mini. That said, most of the camera's operation, if you want to control it manually, takes place via the screen. Setting the AF point requires a quick tap.

Alternatively, you can access the function menu by pressing a virtual button in the bottom right-hand corner of the screen. There's not much in the way of customisation on offer, either in terms of the buttons or the menu options.

## PERFORMANCE

Looking at images at normal printing or web sizes, you get a good impression of detail. However, even images taken at the lowest end of the sensitivity run display areas of smudging when viewed at 100%.

On the plus side, colours are bright and punchy straight from the camera, with a nice amount of vibrance. The camera's metering system keeps exposures well-balanced,

but occasionally it is prone to underexposure. You may need some positive exposure compensation.

The auto white balance system does a good job of producing accurate colours, even when faced with tricky mixed or artificial lighting. Autofocus is quick and generally accurate. When the light drops, focussing is a little slower.

Digital Camera

FEATURES

★★★★★

BUILD QUALITY

★★★★★

IMAGE QUALITY

★★★★★

VALUE

★★★★★

## Overall ★★★★★

**WE SAY:** The Samsung NX mini is an interesting camera, and offers reasonable value for money. But investing in a new lens mount system could be risky if the camera doesn't prove popular.

# CSC TEST

SAMSUNG NX mini

93



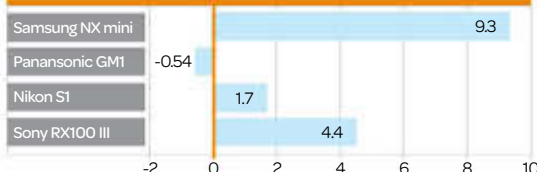
**WHAT'S THIS?**  
Find out how we test on page 6

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## CAMERA BENCHMARKS

How does the NX mini fare against its rivals?

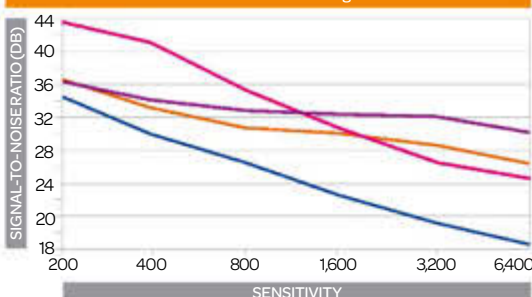
### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** Our tests show that the NX mini has the least accurate colours, although images have a pleasing warm tone.

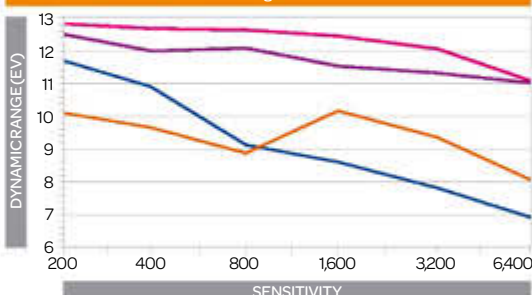
**KEY**  
■ Samsung NX mini  
■ Panasonic GM1  
■ Nikon S1  
■ Sony RX100 III

### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The NX mini is a consistent performer, but while it beats the S1, it's the Panasonic GM1 that comes out on top here.

### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** Although Panasonic's GM1 is again the best performer, the NX mini does well and shows a good dynamic range.

### OVERALL BENCHMARK RESULT

While the NX mini is not the best performing camera on test here, it should be noted that the GM1 has a much larger sensor. In terms of those cameras with the same-sized sensor, Sony's fixed-lens compact RX100 III is an excellent competitor.

\* Raw results use images converted to TIFF



## &gt; THE SPECS

Sensor	28.2 million effective pixel APS-C format BSI CMOS
Focal length conversion	1.5x
Memory	SD /SDHC /SDXC
Viewfinder	OLED EVF with 2,360,000 dots
Video	4K (3,840 x 2,160) at 30fps only
ISO range	100–25,600; expandable to ISO 51,200
Autofocus points	205 phase-detection; 209 contrast-detection
Max Burst Rate	15fps
Screen	AMOLED touchscreen with 1,036,000 dots
Shutter speeds	1/8,000–30 sec plus Bulb
Weight	550g (body only)
Dimensions	138.5 x 102.3 x 65.8mm
Power supply	Li-ion battery supplied

**S**amsung has produced some good compact system cameras, such as the NX30 and NX Mini, but they haven't

really grabbed the attention of the average enthusiast photographer. The NX1, however, has a feature set that few photographers can ignore.

For a start, the sensor inside Samsung's new flagship model is an APS-C format, back-illuminated CMOS device with 28 million pixels. That's the highest pixel count of any APS-C format compact system camera – and it's the first time that a back-illumination technology has been used to make a sensor larger than 1-inch type.

The NX1's high pixel count and the absence of anti-aliasing or an optical low-pass filter over the sensor should be good news for detail resolution. Meanwhile back-illumination means there's more room for the light-gathering diodes, so there's less image noise.

## FEATURES

The sensor is accompanied by a new image-processing engine, Drime V, which is claimed to be 2.8x faster than Samsung's previous engines.



CSC Samsung NX1 &gt; £1,299 / \$1,500

&gt; www.samsung.com

## NX best thing

**Angela Nicholson** is tempted by Samsung's NX1, with the highest pixel count of any APS-C mirrorless camera

This extra processing power enables a maximum continuous shooting rate of 15 frames per second, which knocks the Nikon D4S, for example, out of the park. Samsung claims this rate can be maintained for up to 78 Fine Quality JPEGs or 21 raw files; but with a SanDisk Extreme PRO UHS II card installed, we found we could get 100 Super-Fine JPEGs. If you need to shoot for longer, the shooting rate can be reined in to 8, 10 or 12fps.

The new Drime V processor also enables 4K video recording;



Above The NX1's pop-up flash has a guide number of 11 @ ISO 100.

a native sensitivity range of ISO 100–25,600 (which can be extended to ISO 51,200); and adaptive noise reduction technology, which applies noise reduction locally rather than uniformly across the whole image. In addition, raw images are saved in 14-bit in single shooting mode and 12-bit in continuous shooting.

Autofocusing is handled by Samsung's new NX AF System III, which has 205 phase-detection AF points (153 cross-type) and 209 contrast-detection points. These points cover the majority of the image frame. Samsung claims an AF reaction time of 0.055 sec and operation down to -4EV. When light falls below -4EV, a green focus-assist light shines a grid pattern as far as 15 metres.

In addition to the 3-inch, 1,036k-dot Super AMOLED touch-sensitive screen, which can be tilted up through 90 degrees and down through 45, Samsung has given the



## Stick or twist? Upgrade advice

The NX1 starts a new line of cameras for Samsung, but NX30 owners may look to upgrade to this more 'serious' model. These users may miss the vari-angle screen of the NX30, but they are sure to appreciate the superior autofocus system and 15fps

continuous shooting capability. The new camera also has almost eight million more effective pixels on its sensor, so it can record significantly more detail than the NX30 throughout the sensitivity range. This is coupled with better noise control.

## Zooming in on the... NX1

Lots of control options on offer



NX1 a 2,360k-dot OLED electronic viewfinder for composing and reviewing images. Both of these devices are claimed to have a lag of just 5–10ms.

No Samsung camera would be complete without Wi-Fi connectivity, and the NX1 is no exception. It also has Bluetooth 3.0 communication for making connections quickly with nearby compatible devices, as well

**“It’s exceptionally comfortable in the hand, with a deep front grip and an effective thumb-ridge”**

as Near Field Communication (NFC) technology. This means it should be quick and easy to connect the camera to a range of devices to allow remote control and image sharing.

## BUILD AND HANDLING

Samsung has opted for an SLR-like design for the NX1. While it's not in the same size bracket as the Nikon D4S or even the Canon EOS 5D Mark III, it is quite large for a compact system camera. Some may feel that it gives the NX1 more gravitas.

The NX1 has a magnesium alloy shell and is dust- and splash-proof, so it can be used in bad weather. It feels nicely made and is exceptionally comfortable in the hand, with a deep front grip and an effective thumb-ridge on the rear. The dials all have knurled edges and a high-quality feel.

As usual in a CSC, the NX1 doesn't have an optical viewfinder, but the electronic viewfinder is excellent. Like the AMOLED rear screen, it provides a smooth and detailed view with no sign of pixellation or flickering.

As with most CSCs, the NX1 has a Manual Focus Assist option that sets the camera to show a 5x or

## Meet the rivals...

The models the NX1 is taking on



**Canon EOS 7D Mark II**  
**Price:** £1,599 / \$1,799  
 Canon's latest APS-C format SLR has a fantastic AF system with lots of customisation options.  
**Reviewed:** page 26  
 ★★★★★



**Fujifilm X-T1**  
**Price:** £1,199 / \$1,200  
 A superb EVF and retro controls, as well as high image quality, have made this camera a major hit.  
**Reviewed:** issue 151  
 ★★★★★



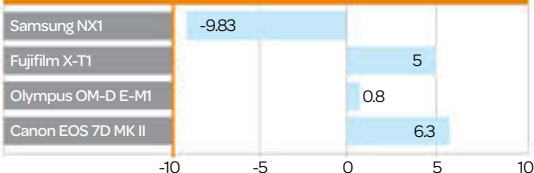
**Olympus OM-D E-M1**  
**Price:** £949 / \$1,299  
 More customisation options than you can shake a stick at, plus top-notch images.  
**Reviewed:** issue 146  
 ★★★★★



## CAMERA BENCHMARKS

How well does the NX1 compete?

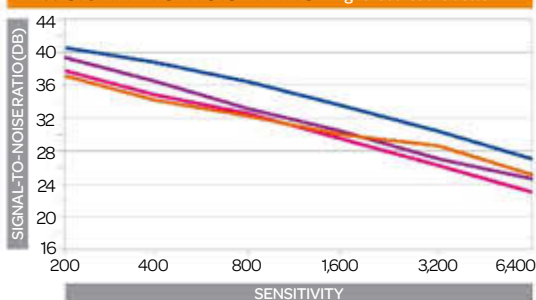
## COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** It may not have scored especially well in the lab, but the NX1's real world images look very good.

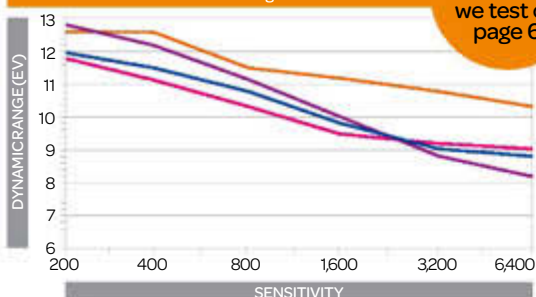
**KEY** Samsung NX1 (purple), Fujifilm X-T1 (pink), Olympus OM-D E-M1 (orange), Canon EOS 7D Mark II (blue)

## RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The Canon EOS 7D Mark II is the only camera to produce cleaner files than the NX1 up to around ISO 12,800.

## RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** While the NX1's low-to-mid dynamic range is excellent, it drops below the competition from around ISO 3,200.

## OVERALL BENCHMARK RESULT

Our lab tests indicate that the Samsung NX1 produces clean images with wide dynamic range, coming first or second in our tests at the low-to-middle sensitivity settings. Its 28MP sensor also captures an impressive amount of detail and, in lab conditions, it is only beaten by the 16MP Fujifilm X-T1 with its X-Trans CMOS II sensor.

\* Raw results use images converted to TIFF

8x magnified view when focusing manually. However, this enlargement is only applied to the frame centre. If your subject is off-centre, you have to focus and recompose the image, which can lead to slight errors in focusing, especially with close subjects. But the combination of the detailed view and focus-peaking makes manual focusing easy.

As there are quite a few physical controls as well as the touchscreen,

**Above** The NX1 was able to track this fast moving subject despite the low light

**“The combination of the detailed view and focus-peaking makes manual focusing easy”**



there's more than one way to control the camera. The active AF point may be set with a tap of the screen or by touching the button at the centre of the navigation controls, then using buttons or dials to find the point. It's quick, but a more direct route would be even better. Although it's possible to customise the function of the navigation controls, they cannot be adjusted to set the AF point directly.

While the NX1's interface is generally clear, there are one or two oddities within the menu, with some of the autofocus options divided across different areas.

The NX1 is compatible with Samsung's iFunction lenses, which enable you to change key features

like sensitivity, white balance and exposure compensation with the camera held to your eye.

## PERFORMANCE

Thanks to the class-leading pixel count of 28 million on its APS-C format sensor, the NX1 can resolve more detail than the 16MP Olympus OM-D E-M1, the 20MP Canon 7D Mark II or the 24MP Nikon D7100 at most sensitivity settings. Also, the back-illuminated sensor controls noise well, the 221 Block Segment multi-metering system delivers correctly exposed results in most situations, and the automatic white balance system takes most natural lighting conditions in its stride.

Images captured in the ISO 100–400 range have an impressive amount of detail, and complex textures are rendered well. Inspecting images on-screen at 100% reveals that detail levels start to dip at around



ISO 800, but the results are still very good and look great at normal printing sizes.

Stepping up to ISO 25,600 (the top native setting) sees a significant drop

**Above** The NX1 has captured the muted tones of this scene very well.

in detail visibility and saturation in JPEGs at 100%, and colours appear to bleed into their surroundings. The results still look good at normal viewing sizes, however, provided prints are kept closer to A4 than A3.

Chroma noise makes itself known at 100% in raw files at ISO 1,600 and above. It becomes problematic in shadow areas at ISO 6,400, when you need to take care with processing to find a balance between noise visibility and detail preservation.

Popular opinion has it that CSCs are unsuitable for shooting sport and action, because the autofocus systems are too slow and the lag in their electronic viewfinders makes it hard to follow a moving subject. The NX1 puts paid to this theory: its EVF is responsive and the AF system can get moving subjects sharp in low light.

Shooting at 15fps gives the camera very little time to focus the lens. The NX1 doesn't get it right every time with a moving subject, but the hit rate is very high in normal outdoor conditions, provided that you set the AF point using Selection AF mode

and keep it over the subject. It's not too shoddy in low light either, although it can't match Canon's 5D Mark III in this respect.

## VERDICT

The NX1 looks and feels like a serious camera, and has plenty of appeal for enthusiast photographers who have yet to commit to a compact system camera brand. It's capable of taking superb images in a wide range of conditions, even when the subject is moving and light levels are low. 📷

**Left** The lock on the mode dial is our preferred on-off design choice.



Digital Camera			
FEATURES	★★★★★	BUILD QUALITY	★★★★★
IMAGE QUALITY	★★★★★	VALUE	★★★★★

**Overall** ★★★★★

**WE SAY:** The NX1 is about as close as you can get to an SLR experience in a mirrorless body, with the extra benefits that modern CSCs can bring. But it could do with a few more customisation options.



## &gt; THE SPECS

Sensor	24.3 million pixel APS-C CMOS sensor
Focal length conversion	1.5x
Memory	SD/SDXC/SDHC
Viewfinder	N/A
Video	Full HD (1,920x1,080p)
ISO range	100–25,600
Autofocus points	179 points (phase-detection), plus 25 points contrast-detection
Max burst rate	6 frames per second
Screen	Three-inch, 922k-dot, tilting touchscreen
Shutter speeds	1/4,000 sec–30 seconds, Bulb
Weight	283g (with battery and memory card)
Dimensions	109.6x62.8x35.7mm
Power supply	NP-FW50 W-series rechargeable battery



**CSC** Sony Alpha 5100 > With 16–50mm PZ lens: £549 / \$649 > [www.sony.com](http://www.sony.com)

# Start here

The Sony Alpha 5100 could be one of the best CSCs on the market for beginners.  
**Amy Davies** finds out how well it performs

## FEATURES

**S**ony has fitted the A5100 with the same excellent 24.3MP sensor and Bionz X processor found in the A6000. The sensor is APS-C sized, but features the same gapless on-chip lens structure as the full-frame A7R. This should make it good in low light.

Like the NEX-5T, the A5100 has a three-inch 922k-dot LCD screen that is touch-sensitive and can be flipped up through 180 degrees. Touch control is fairly limited, however, as it can only be used for setting the AF point or tripping the shutter.

Thanks to the new processing engine, sensitivity range also stays the same at ISO 100–25,600, despite the increase in pixel count.

The Alpha 5100 has Wi-Fi and NFC connectivity and is compatible with PlayMemories apps to expand its feature set. These can be downloaded from the PlayMemories store directly to the camera.

## BUILD AND HANDLING

The Alpha 5100 is smaller than either the A6000 or the NEX-5T, with no top control dial. The camera makes more use of the navigation controls.

Despite its small size and light weight, the A5100 feels solid. It's most suited to use with the 16–50mm f/3.5–5.6 lens in terms of proportions

**Above** The Alpha 5100 is small and sleek, yet still has a decent grip.

– using it with something large like the Zeiss 16–70 f/4 lens makes it feel slightly unbalanced.

The touchscreen makes setting the AF point quick and easy. Once you've set the AF mode to Flexible Spot, simply tap the area on the screen. It's a shame the menu can't be navigated via the touchscreen.

## PERFORMANCE

Colours directly from the camera are vibrant, with good saturation. Detail is rendered well by the sensor. When zooming in at 100%, the impression of detail is great, giving you good scope to crop an image.

In most cases, the A5100's metering system produces accurate exposures. The useful Dynamic Range Optimiser function helps you get a balanced exposure when one area of the scene is darker or brighter than the rest. The automatic white balance

## Meet the rivals...

The A5100 enters a strong market for starter-level CSCs



**Fujifilm X-M1**  
£389 / \$599  
(with 16–50mm lens)  
Combines classic retro looks with everything you need for excellent pictures.  
Reviewed: issue 145  
★★★★★



**Panasonic GF6**  
£299 / \$448  
(with 14–42mm lens)  
One of the best CSCs on the market, especially for the beginner user.  
Reviewed: issue 153  
★★★★★



**Olympus E-PM2**  
£338  
(with 14–42mm lens)  
The OM-D sensor makes this small CSC a terrific little purchase.  
Reviewed: issue 136  
★★★★★

**Capable metering**

Although the bright sky has caused a little under-exposure here, the metering system generally performs well.

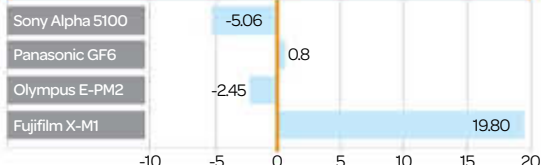
**Rich detail**

Images have plenty of detail, especially at lower sensitivity settings.



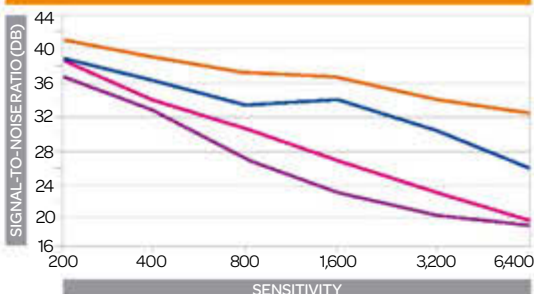
## CAMERA BENCHMARKS

How does the Alpha 5100 measure up?

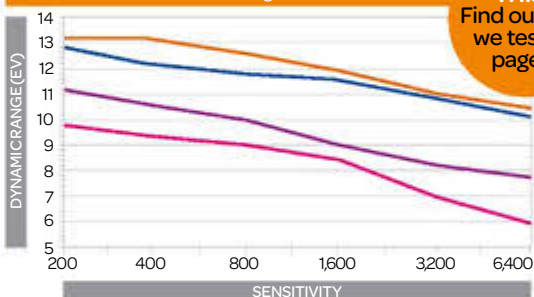
**COLOUR ERROR** Scores closer to zero are better

**COLOUR ERROR RESULT:** Although not the most accurate in the test, the Sony produces vibrant and pleasingly warm images.

**KEY** Sony Alpha 5100 (purple), Panasonic GF6 (pink), Olympus PEN Mini E-PM2 (orange), Fujifilm X-M1 (blue)

**RAW SIGNAL-TO-NOISE RATIO\*** Higher scores are better

**NOISE RESULT:** Although the graph appears to show a relatively low result, this could be an indication of how well detail is kept.

**RAW DYNAMIC RANGE\*** Higher scores are better

**DYNAMIC RESULT:** The Alpha 5100 fares pretty well for dynamic range, comfortably beating the Panasonic GF6.

**WHAT'S THIS?**  
Find out how we test on page 6

## OVERALL BENCHMARK RESULT

In terms of signal-to-noise ratio, the A5100 fares much better when examining JPEG images, which is good news for those who don't want the hassle of editing raw-format images. It's ideal for beginners, who prefer to rely on consistently good images directly from the camera.

\* Raw results use images converted to TIFF

system does a decent job of producing accurate colours in most situations. It can err a little towards warmer tones under artificial light.

The A5100 copes well on high sensitivity settings – at ISO 3,200, for instance, you get an excellent overall impression of detail, and low noise. If you examine at 100%, you can see some areas of the image have a slight painterly effect. If you examine a raw-format image, you can see that the camera's noise reduction is fairly heavy-handed. You can set your own level of noise reduction using Sony's raw data converter software or in third-party software.

Although it's not quite as quick as Micro Four Thirds cameras, the A5100's AF system locks onto targets rapidly. As the light drops, so do acquisition speeds, but it's only rarely that the AF system fails. Shot-to-shot times are decent.

## VERDICT

Sony has again produced a capable camera. Images are punchy direct from the camera, while the amount of detail is impressive.

Pitched at first-time buyers of interchangeable-lens cameras, the A5100 and its kit lens make a good system to get started with. 📷

**Digital Camera**

<b>FEATURES</b>	<b>BUILD QUALITY</b>
★★★★★	★★★★★
<b>IMAGE QUALITY</b>	<b>VALUE</b>
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** A well-performing camera with just a few small let-downs. A good range of features for the novice photographer at a reasonable price. Look out for E-mount lenses to make the most of the sensor.



# CAMERA SHOPPER

A DIGITAL CAMERA SPECIAL

> THE SPECS	
Sensor	24.3 million APS-C (23.5 x 15.6mm) CMOS sensor
Focal length conversion	1.5x
Memory	SD/SDHC/SDXC
Viewfinder	Electronic viewfinder, 0.39 inches, 1,440,000 dots
Video	1080p
ISO range	100 to 25,600
Autofocus points	Hybrid autofocussing, 179 phase detection points, 25 contrast detect points
Max burst rate	11fps
Screen	Three-inch, 921k-dot tilting LCD
Shutter speeds	1/4000 – 30 seconds plus Bulb
Weight	344g (with battery and memory card)
Dimensions	120 x 66.9 x 45.1mm
Power supply	NP-FW50 rechargeable lithium-ion battery



With a new image sensor and the Bionz X processor, the A6000 is a formidable CSC

CSC Body only: £519 / \$649 > [www.sony.com](http://www.sony.com)

With the launch of the Alpha 6000, Sony has introduced what amounts to an APS-C version of the full-frame Alpha 7. At the same time, two old NEX lines, the NEX-7 and the NEX-6, have been discontinued. Sony expects the NEX-7 owner to upgrade to the A7 range, while the A6000 is designed to meet the needs of the NEX-6 owner, sitting at the top of the company's APS-C enthusiast line.

Small and sleek, the A6000 has a similar look and feel to the A7. It features a newly designed 24.3-million-pixel APS-C CMOS sensor. It competes pretty closely with the likes of the Fujifilm X-E2, the Olympus OM-D E-M1 and the Panasonic Lumix G6.

### FEATURES

Along with the new sensor, the A6000 is equipped with the Bionz X, Sony's latest processor, which is also found in the newest full-frames like the A7, the A7R and the A7S. Sony

claims that the Bionz X is three times faster than the previous generation. The image sensor has 179 phase-detection autofocus points. There are also 25 contrast-detection AF points for the hybrid autofocussing system. At the time of launch, Sony claimed that the camera had the fastest AF in the world among cameras with an APS-C sized sensor.



Sony's 16-70mm f/4 lens is a powerful partner for the Alpha 6000

On the back of the A6000 is a tiltable LCD screen, which is joined by an electronic viewfinder: the same 0.39-inch, 1.4-million dot device found on the RX10 premium bridge camera.

Reflecting the broader trend, the A6000 comes complete with built-in Wi-Fi and NFC. Like several other Sony cameras, it is customisable with apps downloadable from Sony's cloud-based photo storage service PlayMemories ([www.sony.net/Products/playmemories](http://www.sony.net/Products/playmemories)).

As its standard kit lens choice, the A6000 comes with a 16-50mm f/3.5-5.6 power zoom – the same lens that is packaged with the A5000. You can also buy it body only, giving yourself the freedom to choose from the large range of different E-mount lenses now available. Perhaps the perfect all-round lens for this camera is the Zeiss 16-70mm f/4 optic, but that comes with a £799 price tag – quite a bit more than the camera itself.

### Meet the rivals...

See how the Sony A6000 stacks up against the competition



**Fujifilm X-T1**  
Body only: £949 / \$1,200  
The X-T1 is not only beautiful, but it's capable of producing some truly superb images.  
Reviewed: issue 151  
★★★★★



**Panasonic GX7**  
Body only: £499 / \$698  
An ideal choice for experienced photographers looking for a smaller alternative to their SLR.  
Reviewed: issue 144  
★★★★★



**Olympus OM-D E-M1**  
Body only: £949 / \$1,299  
A superb camera, but it is quite complex and it takes some time getting to know.  
Reviewed: issue 146  
★★★★★



## BUILD AND HANDLING

Those who appreciate lots of dials and buttons will enjoy the A6000. It has plenty of controls available, and, like other Sony cameras, pretty much all of them are customisable to help you adjust the camera to suit the way you take photos.

The grip of the A6000 is ever so slightly more pronounced than on the NEX-6, making it easier to hold. There's also a nice texture covering the camera. On top of the camera are two dials: one for controlling the shooting mode (such as automatic, semi-automatic or manual), and another for altering the shutter speed or aperture, depending on the mode you're shooting in.

Setting the autofocus point on this camera is a task that would be speedier with a touchscreen, but it's not too bad if you set the right custom buttons. To make things quicker, set Focus Area to Flexible

Spot. From here, you simply need to press the button in the centre of the scrolling dial on the back of the camera to bring up the focus point selection option. You can then use the directional keys to move around the screen. It's worth noting that this is the default option for the central button when Flexible Spot is selected: if you've got it set to anything else, it won't work in the same way.

Although it's not a touchscreen, the screen tilts, which is useful for shooting from some awkward angles, or for shielding the screen from glare. The viewfinder is bright and clear, and doesn't seem to suffer from any noticeable lag. Setting up Wi-Fi is quick and easy, and makes the A6000

**"Those who appreciate dials and buttons will enjoy the A6000. It has plenty of controls available"**

**WHAT'S THIS?**  
Find out how we test on page 6

## CSC TEST

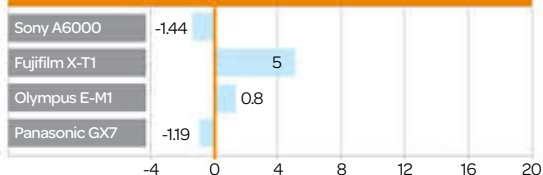
SONY ALPHA 6000

101

### CAMERA BENCHMARKS

How does the Sony A6000 measure up?

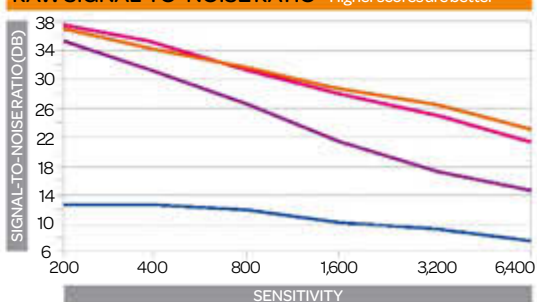
#### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** The A6000 strikes a good balance between accurate colours and pleasing warm tones.

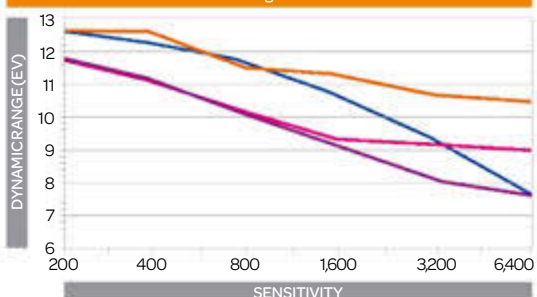


#### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** Technically, the A6000 is the worst performer, but Sony is prioritising detail reproduction of noise reduction.

#### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** Both the A6000 and the X-T1 put in a similar performance, which is a reflection of their warm tones.

#### OVERALL BENCHMARK RESULT

A good consistent performance is put in by the A6000, and while it's not technically the best performer in the group, both signal-to-noise ratio and dynamic range results are pleasing, especially for JPEG images.

\* Raw results use images converted to TIFF

**Above** The 24.3-million-pixel sensor of the A6000 is capable of resolving a great amount of fine detail

convenient for quickly sharing photos to your smartphone or tablet.

## PERFORMANCE

Sony is producing some of the most interesting compact system cameras currently on the market and, pleasingly, the A6000 is another great performer to add to the line-up. Its images are great, with beautifully saturated colours. You can experiment with how JPEGs look straight from the camera by adjusting

From the makers of **Digital Camera** magazine



# Zooming in on the... Sony A6000

A quick tour of the camera's key features

**Top Left:** A sensor in the A6000's eyepiece detects when the camera is lifted to the eye

**Bottom Left:** Press this button to raise the flash. You can also add an external flash via the hotshoe

**Bottom Center:** Tilting downwards and upwards, the screen is useful for shooting from awkward angles

**Bottom Right:** This customisable button can be set to a specific function of your choosing – such as sensitivity

**Top Right:** This dial controls different functions depending on the shooting mode, like altering the aperture

**Middle Right:** Press the function button to access commonly used settings, such as white balance

❶ Creative Styles – a number of which are available as pre-stored settings. Detail is rendered very well by the A6000. Generally, image smoothing only starts to become problematic

“Sony has come within touching distance of creating the perfect compact system camera”

for normal printing sizes in shots taken at around ISO 3,200 upwards. Examining images at 100% from around ISO 1,600 upwards, you will find areas of the image that have a painterly effect, but the overall effect is good.

The camera's metering system does a good job with exposure, although it sometimes struggles in high-contrast situations, when you'll need to dial in some exposure compensation. Similarly, the automatic white balance system is a good performer, although it can

be slightly confused by some artificial light sources.

In good light, autofocussing speeds are very quick, dropping as the light levels drop, but only struggling to lock on at all in very dark conditions.

The 16-50mm f/3.5-5.6 kit lens is a good all-rounder to get started with, but this is the kind of camera you'll want to buy additional lenses for. Luckily there are some great ones for the E-mount.

Battery life is better than in the A7, probably due to the smaller sensor, but it's still worth buying a spare battery if you travel. 📷



**Digital Camera**

<b>FEATURES</b> ★★★★★	<b>BUILD QUALITY</b> ★★★★★
<b>IMAGE QUALITY</b> ★★★★★	<b>VALUE</b> ★★★★★

**Overall** ★★★★★

**WE SAY:** Sony has come within touching distance of creating the perfect CSC. Fantastic image quality and customisable buttons are great to have, but a couple of niggles keep it from greatness.

# Master your **CAMERA**

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[myfavouritemagazines.co.uk/photo](http://myfavouritemagazines.co.uk/photo)





# CAMERA SHOPPER

A DIGITAL CAMERA SPECIAL

> THE SPECS	
Sensor	24.3MP APS-C format (23.5 x 15.6mm) Exmor CMOS
Focal length conversion	1.5x
Memory	SD/SDHC/SDXC and Sony Memory Stick
Viewfinder	Electronic viewfinder with 2,359,296 dots (100% cover)
Video	Full HD (1,920 x 1,080) at 60p
ISO range	100 to 25,600; expandable to ISO 50-25,600 for stills, ISO 100-12,800 for movies
Autofocus points	Phase-detection with 79 points (15 cross-type)
Max burst rate	12fps (aperture locked at start)
Screen	3.2-inch, 1,229k-dot TFT
Weight	647g (body only)
Dimensions	142.6 x 104.2 x 80.9mm



SLT Sony Alpha 77 II > Body only: £999 / \$1,198

> [www.sony.com](http://www.sony.com)

After the announcement of the full-frame E-mount Sony A7, A7R and A7S compact system cameras and the demise of the NEX brand, you could be forgiven for thinking that Sony might not continue with its A-mount SLT (single lens translucent) cameras. However, the arrival of the Sony Alpha 77 II indicates that this isn't the case.

As you might guess, the Alpha 77 II replaces the Alpha 77, which is now discontinued, and it has an almost identical shape and design. As before, the new camera is aimed at enthusiast photographers who want a step up from an entry-level model. It sits under the full-frame Alpha 99 in Sony's SLT line-up.

## FEATURES

Like the Alpha 77, the A77 II has a 24-million-pixel sensor, but this is a new device that benefits from the progress that has been made with sensor design in the two-and-half years since the A77 first arrived. Also, for the first time in an A-mount camera, the sensor signal is processed by a Bionz X engine. This has given Sony the confidence

# Round two

Sony's enthusiast-level Alpha 77 II gets a speed boost as well as better image quality. **Angela Nicholson** checks it out

to allow sensitivity to be set in the native range ISO 100-25,600 for still images, with a low expansion setting of ISO 50 also available.

One of the benefits of the SLT design is that there can be full-time phase-detection autofocus during movie shooting and when composing images on the rear screen. Sony has used a newly developed phase-detection sensor with 79 AF points (15 of which are the more sensitive cross-type) in the Alpha 77 II. Sensor development means that the A77



Above This tilting 3.2-inch screen displays a superb level of detail.

II's CCD AF sensor produces less electronic noise than previous devices and this helps with autofocusing speed and accuracy, as well as boosting low-light performance.

Spot AF performance is also claimed to have been improved, with weighting given to the centre of the spot. There's a collection of AF-point selection options including Wide, Zone, Flexible Spot, Local, Expanded Flexible Spot and Lock-on AF. In Expanded Flexible Spot mode, you select one AF point and the camera supports this with the surrounding eight points, which is useful when shooting a moving subject.

It's also possible to adjust the AF tracking duration across five levels via the menu. The low settings are useful when the subject distance isn't expected to change quickly, while high levels suit shooting subjects at different distances. In addition, a new AF Range Control option allows you



## Stick or twist? Upgrade advice

Sony is proud of the progress it has made with the autofocusing system for the A77 II. We're told that five engineers conducted field tests for six months with rival high-end cameras like the Canon EOS 1DX, the Canon 70D, the Nikon D4, the Nikon D7100

and the Panasonic GH3, in order to find the best parameters for AF while shooting a variety of sports and action. The new system has 79 AF points, whereas the original A77 (pictured) has just 19 AF points, of which 11 are cross-type.

FOR TEST  
IMAGES AND  
RESOLUTION  
CHARTS, VISIT

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CAMERAS

## Zooming in on the... Sony Alpha 77 II

Sony's made important changes from the A77



to restrict the AF to working within a specific distance range – useful when there are objects between the camera and the subject.

According to Sony, almost all of its A-mount lenses are compatible with the 79 AF points, although only 61 are available when you're shooting at 12fps. Sony's 500mm f/8 lens is a notable, but not surprising, exception: it will allow only the centre AF point to be used.

As suggested above, the A77 II can shoot a maximum rate of 12 frames per second with AF tracking, and the buffer has capacity to allow up to 25

## “Almost all of Sony's A-mount lenses are compatible with the A77 II's 79 AF points”

raw and JPEG images to be captured in a single burst, but aperture is locked at the start of the sequence.

Other pleasing additions to the A77 II's featureset include an HDMI port, which can supply clean video output to external storage devices, and Wi-Fi connectivity. As the A77 II has an NFC chip, owners of NFC-enabled smartphones and

tablets can connect to the camera by touching the two devices together. Interestingly, despite the presence of Wi-Fi connectivity, the A77 II cannot make use of Sony's PlayMemories Camera apps.

## BUILD AND HANDLING

Sony has given the Alpha 77 II the same tough feel, overall shape and control layout as the A77, and the vertical grip that was produced for the original model can be used with the new camera. There are a few differences, however: there are 27 features that can be assigned to one of the 12 slots in the Function menu, for example. It's also possible to customise the function of many of the buttons, but the default settings work well.

If you like using Picture Effects (Toy Camera, Pop Color, Posterization, Retro Photo, Soft High-key, Partial Color, High Contrast Mono, Soft Focus, HDR Painting, Rich-tone Monochrome, Miniature, Watercolor and Illustration are provided), it's worth assigning this and image quality to the Function menu so that you can quickly turn off raw recording

## Meet the rivals...

There's a choice of SLRs and CSCs at this price point



**Canon EOS 70D**  
Price £849 / \$1,099  
This 20.2MP SLR has a responsive vari-angle touchscreen, and captures great images.  
Reviewed: issue 144  
★★★★★



**Nikon D7100**  
Price £809 / \$1,097  
A 24.1MP SLR with superb resolving power and an excellent AF system, but limiting buffer capacity.  
Reviewed: page 52  
★★★★★



**Fujifilm X-T1**  
Price £988 / \$1,299  
This SLR-style CSC has an excellent electronic viewfinder and traditional exposure controls.  
Reviewed: issue 151  
★★★★★



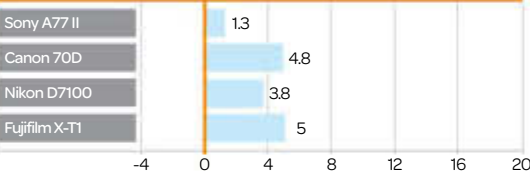
# CAMERA SHOPPER

A DIGITAL CAMERA SPECIAL

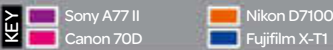
## CAMERA BENCHMARKS

How does the Sony Alpha 77 II measure up?

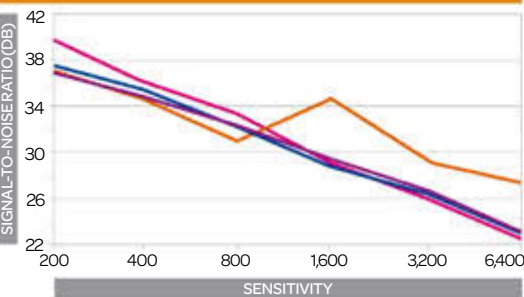
### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** Our tests show that the Alpha 77 II is comfortably the most accurate camera in this group.

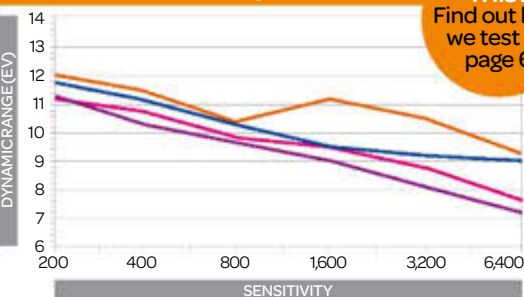


### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The A77 II is one of the lower performing cameras here, but as with the JPEG images, this may be to reveal more detail.

### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** The Sony Alpha 77 II's raw file dynamic range lags behind competing cameras through most of its sensitivity range.

### OVERALL BENCHMARK RESULT

It may not have the best performance in the lab tests, but the A77 II produces high-quality images. We suspect that the signal-to-noise ratio has been limited a little to allow more detail to be visible. However, the lower dynamic range indicates that highlights may burn out slightly earlier than with the competing cameras.

\* Raw results use images converted to TIFF

and access the effects. As with other Sony cameras, the Creative Style options (Standard, Vivid, Neutral, Clear, Deep, Light, Portrait, Landscape, Sunset, Night, Autumn, Black & White and Sepia), which give JPEG images a particular appearance, can be used when shooting raw images simultaneously.

While the three-inch 1,229k-dot vari-angle screen is useful for composing images from awkward

**Above** Noise is controlled well in this ISO 25,600 raw image.

“The articulating hinge seems unnecessarily complicated, and it takes a while to get used to it”



angles, the articulating hinge seems unnecessarily complicated, and it takes a while to get used to its quirks and limitations. The hinges on cameras such as the Canon 70D and Nikon D5300 are much more straightforward.

As on the Sony A7 and 7R, the 2.3-million-dot electronic viewfinder (EVF) is bright and clear, with plenty of detail visible. As usual with an EVF, this brings the benefit of seeing the image as it will be captured. However, when the brightness is set to Automatic rather than manual, the extra gain applied in dark conditions can mean that the viewfinder image looks significantly brighter than the

final image, so it's best to set the brightness to Manual.

### PERFORMANCE

Even at the highest selectable sensitivity setting of ISO 25,600, noise is controlled well in raw files, having a fine texture with no banding or clumping visible at 100% on-screen. With careful processing, it's possible to conceal most of the coloured speckling in raw files and produce an image with just luminance noise giving some grain. Simultaneously captured JPEG files look softer than their raw counterparts, and close examination reveals a painterly texture with slightly sharpened edges. They generally look acceptable viewed at A3 size, but we prefer the slightly sharper, grainier look of the raw files.

As you'd hope with a 24MP sensor, the A77 II is capable of





recording a high level of detail at the lower sensitivity settings. While the A77 II's AF system struggled a little more than the Canon 5D Mark III in the low, flat light of an unlit music gig, there were no such problems with a fast-moving subject in good light. It was positive, fast and accurate. In continuous AF mode with AF selection set to Expanded Flexible Spot, it got rows sharp in a flash and was able to keep them sharp by using the surrounding points when panning.

**Above** Using the Landscape Creative Style boosts blues and greens.

When AF selection was set to Lock-on AF: Flexible Spot or Lock-on AF: Expanded Flexible Spot, it also tracked them around the frame if the original AF point wasn't kept in the correct location.

As usual, AF performance varies according to the lens that's mounted, and a good optic is required to get the best from the Alpha 77 II. It performs very well with the 70-200mm f/2.8, for example, but is a little more hesitant in low light with the 85mm f/2.8 – which also has a much noisier focus mechanism.

We used the Multi-segment metering system almost exclusively during this test. Although we shot in a wide range of conditions, there were only a few when a little exposure compensation was required.

Colours are also good straight from the camera, and the white balance system general does a good job when set to the Automatic setting.

## VERDICT

While the changes made to the Alpha 77 II may not seem dramatic, Sony has worked on the most important aspects – the sensor and processor – to boost speed and image quality, as

well as the autofocus performance. Many will recognise that it's sensible to stick with the same pixel count as with the Alpha 77: 24 million pixels capture enough detail for most purposes and allow big prints to be made. The files are large without being unmanageable by the average modern computer.

The AF system improvements and the A77 II's ability to control noise at high sensitivity levels, combined with the general high quality of the images, makes it a versatile camera that will be attractive to enthusiast photographers who want to shoot a wide range of subjects in a variety of conditions. 📷



**Left** The Alpha 77 II has the same shape as the A77 camera it replaces.

Digital Camera	
FEATURES	BUILD QUALITY
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** The A77 II's image quality is excellent, even at high sensitivity settings, and the autofocus system is fast and accurate. It's a great choice for enthusiasts who want versatility from their camera.



> THE SPECS	
Sensor	12.2MP full-frame (35.6 x 23.8mm) Exmor CMOS
Focal length conversion	1x
Memory	SD/SDHC/SDXC and Sony Memory Stick
Viewfinder	OLED electronic viewfinder with 2,359,296 dots (100% cover)
Video	Full HD (1,920 x 1,080p); 4K to an external recorder
ISO range	100 to 102,400; expandable to ISO 50-409,600 for stills
Autofocus points	Contrast-detection system with 25 points
Max burst rate	5fps
Screen	Tilting three-inch, 921k-dot TFT
Shutter speeds	1/8,000-30 sec, Bulb
Weight	446g (body only)
Dimensions	126.9 x 94.4 x 48.2mm
Power supply	NP-FW50 W-series



CSC Sony Alpha 7S > Body £2,099 / \$2,499 > www.sony.com

# Small sensation

Sony's most expensive Alpha 7-series CSC has the family's lowest resolution to date. **Angela Nicholson** gets the low-down

**S**ony now has three full-frame compact system cameras, giving you a choice depending upon what is most important to you. Those wanting the ultimate in detail resolution have the 36MP Alpha 7R, while photographers for whom low-light capability and video are of paramount importance should go for the 12MP A7S. The middle ground is occupied by the 24MP A7, which is capable of recording lots of detail, but has faster responses than the A7R.

### FEATURES

Like the A7 and A7R, the A7S has the Sony E-mount, but its full-frame Exmor CMOS sensor has 12.2 million effective pixels and a native sensitivity range of ISO 100-102,400. This can be expanded for stills and video up to ISO 409,600, a figure matched only by the Nikon D4S. Sony has also packed a lot of video technology into the A7S, including

the ability to record 4K video to an external device connected via HDMI.

### BUILD AND HANDLING

Sony's Alpha 7-series of (CSC) sets a new benchmark for size. Apart from a slightly more bulbous grip, the A7S is similar in size to the Olympus OM-D E-M5, which has a smaller sensor.

**Above** It may be small, but the A7S feels solidly made.

Thanks to its magnesium alloy body, the A7S feels solid in the hand. All the dials have a knurled edge to give them greater purchase, and the small control buttons that scatter the surface of the body have a quality feel. It's also exceptionally comfortable to carry and use for long periods.

As on the A7 and A7R, the OLED electronic viewfinder provides a superb view with plenty of detail and colours. Exposure can be seen changing as adjustments are made, so you usually know what you're going to get before you shoot.

The 3-inch 921k-dot tilting LCD also provides a clear view, but the Sunny Weather setting is a must in daylight on a UK summer's day, even if the sun is behind a cloud.

### PERFORMANCE

While its lower pixel count means that the Alpha 7S can't resolve nearly

### Meet the rivals...

Competing cameras that tackle different facets of the Alpha 7S



**Sony Alpha 7**  
£1,159 / \$1,499  
The same build as the A7S, but with a 24MP sensor and a hybrid AF system for faster focusing.  
Reviewed: issue 147  
★★★★★



**Nikon D4S**  
£4,679 / \$6,497  
Nikon's flagship SLR has a 16MP full-frame sensor and a top sensitivity setting of ISO 409,600.  
Reviewed: page 64  
★★★★★



**Panasonic GH4**  
£1,199 / \$1,698  
It has a 16MP Four Thirds sensor, a touch-sensitive tilting screen and the ability to record 4K video.  
Reviewed: page 84  
★★★★★



**WHAT'S THIS?**  
Find out how we test on page 6

**Above That grip** makes the A7S comfortable to hold.

### Depth of field

Even at f/8, depth of field is quite restricted at longer focal lengths, like this shot taken at 122mm.

### Colour

Colours are vibrant straight from the camera.

as much detail as either the Alpha 7 or 7R, or the 16MP Nikon D4S, images look sharp and make high-quality A3 prints. Images are generally well-exposed, but the brightness of the subject under the active AF point can skew the exposure a little when using the Multi-segment metering.

Noise is also controlled well. Although we wouldn't recommend using ISO 409,600 unless you really have to, the results from the A7S look better than from the Nikon D4S.

While it wouldn't be our first choice for shooting sport, the A7S's AF system can lock onto and track moving subjects in good light. It also manages to focus the lens automatically in low-light conditions, but it's slower than a comparably priced SLR.

We have found before that the A7-series of cameras tends to gobble through battery power. The A7S is the

same, with only around 360 shots possible on a single charge.

### VERDICT

The A7S could be a good choice for videographers building a rig around a small camera, or wedding photographers who rarely need to produce prints over A3 size. 📷

### Digital Camera

#### FEATURES

★★★★★

#### IMAGE QUALITY

★★★★★

#### BUILD QUALITY

★★★★★

#### VALUE

★★★★★

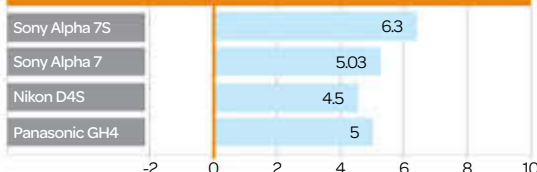
### Overall ★★★★★

**WE SAY:** It's a great camera, but its low pixel count and high price relative to the A7 and A7R mean it's only likely to find favour with those who need to shoot in near-dark conditions or want extra control over video.

## CAMERA BENCHMARKS

How does the Alpha 7S fare against its rivals?

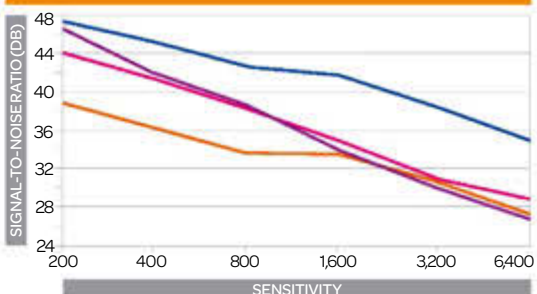
### COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** Colours are on the well-saturated side technically, but they look good straight from the camera.

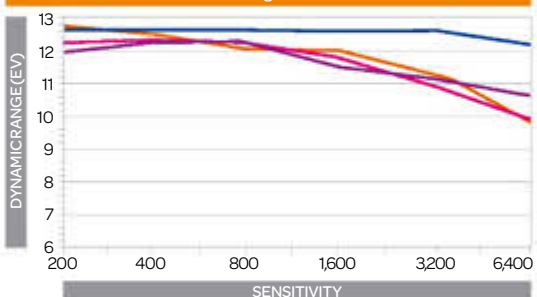
**KEY** Sony Alpha 7S Sony Alpha 7  
Nikon D4S Panasonic GH4

### RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** Although the Panasonic GH4 leads the way for the majority of its sensitivity range, this doesn't extend as far as the A7S's.

### RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** The A7S beats the Nikon D4S at higher sensitivity values, indicating it can capture a wider range of tones in a single shot.

### OVERALL BENCHMARK RESULT

Our tests show that there is some benefit to having larger photo receptors, but the Alpha 7S doesn't have it all its own way. The Panasonic GH4 in particular offers stiff competition, although its sensitivity range doesn't extend as high as the A7S.

\* Raw results use images converted to TIFF



## &gt; THE SPECS

<b>Sensor</b>	24.3 million effective pixel full-frame (35.2 x 23.9mm) Exmor CMOS
<b>Focal length conversion</b>	1.0x
<b>Memory</b>	SD /SDHC /SDXC / Memory Stick
<b>Viewfinder</b>	0.5-inch, 2.4-million-dot electronic viewfinder
<b>Max Video Resolution</b>	Full HD (1,920 x 1,080) at 60fps
<b>ISO range</b>	50–25,600
<b>Autofocus points</b>	117 phase detection; 25 contrast detection
<b>Max Burst Rate</b>	5 frames per second
<b>Screen</b>	3-inch, 1,228,800-dot tilting LCD
<b>Shutter speeds</b>	30–1/8,000 sec plus Bulb
<b>Weight</b>	556g (body only)
<b>Dimensions</b>	127 x 96 x 60mm
<b>Power supply</b>	NP-FW50 rechargeable lithium-ion battery (supplied)



CSC Sony Alpha 7 II &gt; Body only: £1,499 / \$1,698

> [www.sony.com](http://www.sony.com)

# Bigger inside

Image stabilisation and a modified grip – but what about the Alpha 7 II's image quality? **Angela Nicholson** investigates

**S**ony caused a major stir when it introduced the 24MP Alpha 7 and 36MP Alpha 7R – the first compact system cameras to have full-frame sensors. This is something that has still yet to be done by any other manufacturer.

What's more, these two cameras (subsequently joined by the 12MP Sony A7S) are incredibly small for full-frame cameras, not too dissimilar in size to the Micro Four Thirds Olympus OM-D E-M1, and they offer a level of control similar to full-frame SLR models.

Now Sony has created new waves of excitement by introducing an update to the A7, in the guise of the A7 II. However, some may feel that changes are rather small as, like the vast majority of the new camera's components, the sensor is the same 24MP Exmor CMOS device used in the original A7.

## FEATURES

The biggest news about the A7 II is that it's the first full-frame digital camera to feature in-body stabilisation. This means that the

sensor can move to correct for accidental camera movements in five directions during the exposure. When a stabilised Sony lens is used, the stabilisation effect is optimised, but not cumulative: either one or the other system is used.

Although the A7 II has the same hybrid AF system as the A7, Sony

**Below** A tilting screen can be useful for awkward angles.



claims that new focusing algorithms enable a 30% increase in AF speed, with faster and longer high-speed drive and a 1.5x improvement in AF Tracking performance. There's also the addition of Lock-on AF (Wide/Zone/Centre/Flexible Spot) to help follow moving subjects.

Sony has also given the A7 II some of the video features of the A7S. For example, it can now record in XAVC S, AVC-HD or MP4 formats. Picture Profiles offer the ability to set the gamma to Sony's S-Log2 for reduced contrast and greater dynamic range, while the Time Code feature helps with scene identification.

Other specification highlights of the A7 II include a sensitivity range of ISO 50–25,600; a



## Stick or twist? Upgrade advice

The original Alpha 7 (pictured) is an excellent camera, but some found its handling awkward, with the large front dial sitting where many would naturally expect the shutter release button to be. The A7 II corrects this problem and adds a better grip and an extra

customisation button. There's also a new five-axis stabilisation system and an improved AF system, but as the sensor, processing engine, white balance and metering systems are the same as the older camera, it's not a compelling upgrade.

## Zooming in on the... Sony Alpha 7 Mark II

The controls build and improve on the original A7



This sensor detects when the camera is held to the eye, turning off the main screen and activating the finder.



As usual with an EVF, it shows the impact of any settings adjustments, but you can turn this off if you prefer.



The standard auto, semi-automatic and manual modes are joined by a series of scene-specific shooting modes.



The shutter button is further forward than on the original Alpha 7: it's just where your finger expects it to be.

While this new dial in front of the shutter is a little fiddly to find with cold fingers, it's a better control arrangement than on the original A7.



0.5-inch, 2.4-million-dot electronic viewfinder (EVF); a tiltable 3-inch RGBW 1,228,800-dot LCD screen; a battery life of 350 shots; built-in Wi-Fi connectivity; Near Field Communication (NFC) technology; a maximum continuous shooting rate of 5fps; and a standard-shape hotshoe with extra contacts to connect accessories like the microphone adaptor.

**“The image in the EVF is natural, with just a shimmer to remind you that it’s an electronic device”**

### BUILD AND HANDLING

Like the other cameras in the Alpha 7 series, the A7 II has a rather angular, but attractive old-school appearance.

According to Sony, the sensor housing has been made stronger in the A7 II, with more magnesium alloy than in the original camera. This, combined with the camera's moisture and dust sealing, makes it durable.

One surprise when you use the Alpha 7 II for the first time is how loud the shutter is. You could be forgiven for thinking that it's an SLR with a mirror slapping out of the way before the shutter opens.

The A7 II has a nice, deep grip, with a textured coating that gives excellent purchase. On the back of the camera there's a small but effective thumb-ridge, which has the same coating as the front grip. These elements make the camera feel comfortable and secure in your hand.

Many of the buttons on the A7 II are customisable, so it's worth spending some time using the camera and experimenting with different customisation settings. It's also

### Meet the rivals...

The cameras taking on the Sony A7 II



#### Fujifilm X-T1

Price: £1,099 / \$1,299  
A superb 16MP APS-C format CSC with a large electronic viewfinder that's proving a bit hit.  
Reviewed: issue 151  
★★★★★



#### Nikon D750

Price: £1,749 / \$2,297  
An excellent 24MP full-frame sensor, tilting screen, Wi-Fi connectivity and a fantastic AF system.  
Reviewed: page 56  
★★★★★



#### Samsung NX1

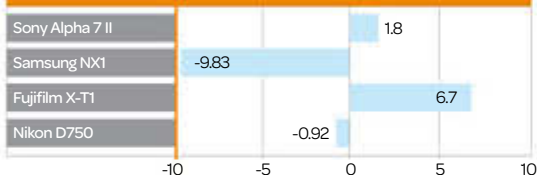
Price: £1,299 / \$1,500  
The highest resolution APS-C format CSC around, the NX1 also has an excellent viewfinder.  
Reviewed: page 94  
★★★★★



## CAMERA BENCHMARKS

How does the A7 II fare against its rivals?

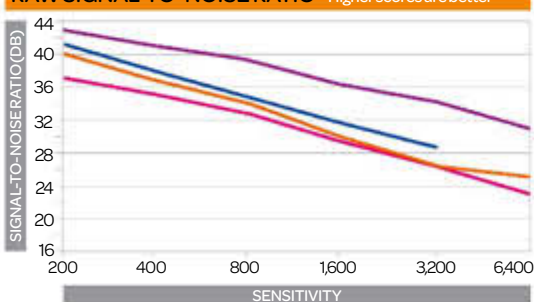
## COLOUR ERROR Scores closer to zero are better



**COLOUR ERROR RESULT:** This shows that the A7 II renders colours very accurately in its default Standard Creative Style option.

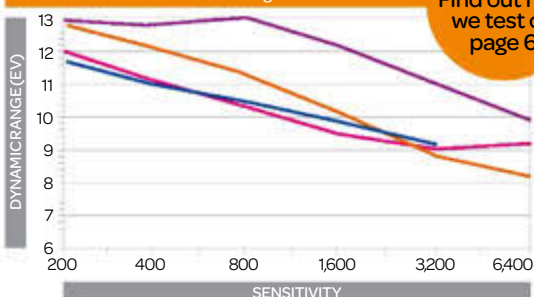
**KEY** Sony Alpha 7 II (purple), Samsung NX1 (pink), Fujifilm X-T1 (orange), Nikon D750 (blue)

## RAW SIGNAL-TO-NOISE RATIO\* Higher scores are better



**NOISE RESULT:** The A7 II's raw files beat the rest for much of its sensitivity range, but there's a dramatic drop at ISO 12,800.

## RAW DYNAMIC RANGE\* Higher scores are better



**DYNAMIC RESULT:** The A7 II is the clear winner, indicating its raw files can cope with quite aggressive post-capture adjustment.

**WHAT'S THIS?**  
Find out how we test on page 6

## OVERALL BENCHMARK RESULT

We found that the Alpha 7 II is capable of recording an impressive amount of detail, which matches that of a camera with a greater pixel count. Noise is also controlled well up to ISO 6,400. At 100%, edges in real-world JPEG images captured at low- and mid-range sensitivities are a little more defined than the area between them.

\* Raw results use images converted to TIFF

reflections and glare in very bright conditions. And of course, a tilting screen is of little use when shooting upright format images.

Fortunately, like the other A7-series cameras, the A7 II has an excellent electronic viewfinder. This provides a nice clear view of the scene, with plenty of detail. The image in the EVF is natural, with just a shimmer here and there to remind you that it's an electronic device rather than an optical one. However, colours are a little less saturated in the EVF than they are on the screen, in captured images and in real life.

On the whole, the A7 II's controls are sensibly arranged, but the video record button is on the side of the thumb-ridge. It's not a major issue to press this button if the camera is tripod mounted, or perhaps on a rig, but if you're hand-holding it you need to adjust your grip significantly to press it. Another gripe is that the exposure compensation dial sometimes gets knocked out of place.

## PERFORMANCE

Our lab tests indicate that the A7 II is capable of resolving as much detail as the 28MP Samsung NX1 in lab conditions. Noise is also controlled well through the lower, middle and moderately high sensitivity settings. By ISO 6,400, there's quite a bit of chroma noise visible in raw files viewed at 100% (when noise reduction is turned off).

The in-camera noise reduction applied to simultaneously captured JPEG files conceals this coloured speckling well, without too much loss of detail. The luminance noise remaining after the process is

fine-grained and evenly distributed.

Step-up to ISO 12,800 and 25,600, however, and the noise reduction applied to JPEGs starts to take its toll, with more noticeable loss of detail and smoothing at 100%. Simultaneously captured raw files offer the opportunity to fine-tune noise reduction to find an acceptable mid-ground, with some noise visible along with greater detail. For the most part, though, we recommend avoiding the top sensitivity setting if you want to make prints or view images at A4 size or larger.

Naturally, we were keen to investigate the performance of the A7 II's in-body image stabilisation system. When using the camera with the Carl Zeiss Vario-Tessar FE 24-70mm f/4 ZA OSS lens, which is itself stabilised, we could get acceptably sharp results at 70mm using a shutter speed of 1/6 sec. While this stabilisation doesn't quite meet the 4.5EV maximum claimed by Sony, it is very good.

In normal outdoor daylight conditions, the A7 II's autofocus system is very good. Fast and accurate in most situations, it even copes well with moving subjects and can keep up with them as they move away from or towards the camera. The Lock-on AF modes are particularly good for this type of situation. That said, professional or enthusiast sports photographers may be better off with



The high dynamic range means there's detail visible in the shadows and highlights

**"In normal outdoor daylight conditions, the Alpha 7 II's autofocus system is very good"**



possible to customise the Function menu, accessed by pressing the Fn button on the back of the camera. Each of the menu's 12 slots can be customised to access any of 32 features. The default settings are good, but it's a good idea to keep an eye on which features you use. While the A7 II's tilting screen is useful when shooting low-level landscape-orientation images, like most screens it suffers a little from

**Right** A converter allows Alpha mount lenses to be used on the A7 II.





cameras like the Canon 7D Mark II or the Nikon D750, which give greater control over how a subject is tracked and better low-light performance.

For the most part, the A7 II produces pleasant colours in its default Standard Creative Style mode. It's a good all-round option, but the Landscape setting tends to produce more attractive landscape images with greater saturation, a little more warmth and slightly higher contrast.

The automatic white balance system is also a good performer, and can be relied upon in a wide range of lighting conditions. As usual, it struggles a bit under some artificial

**Above** Shooting at f/11 has captured enough detail in the first flower, but blurred the two behind nicely.

**Below** It's handy to have a quick route to exposure compensation.

lighting, but it's easy to set a Custom white balance value.

When we were shooting outside in bright winter sunshine and using the A7 II's 1200-zone evaluative metering system, we found that many of our images benefitted from dialling in a little negative exposure compensation. The benefit of an electronic viewfinder is that you can see the impact of any exposure adjustments before taking the shot, so the need for exposure compensation isn't a major drama.

We haven't fully tested the video capability of the A7 II, but our initial assessment is that it produces high-quality footage, which generally looks natural.


## VERDICT

As well as having a high-quality feel, a durable build and generally excellent control layout out (apart from the irritating video record button), the Alpha 7 II produces superb-quality images. And while its autofocus system isn't up to the standard demanded by professional sports

photographers, it's fast and accurate in decent lighting conditions.

Although you may need to use the compensation dial on the top-plate, getting the correct exposure is easy with an electronic viewfinder to show you the impact of such changes.

The in-camera stabilisation system is also useful, enabling sharp images to be taken at shutter speeds that would not normally be possible when hand-holding a camera.

It all adds up to make the Sony Alpha 7 II a very attractive camera. 

Digital Camera	
FEATURES	BUILD QUALITY
★★★★★	★★★★★
IMAGE QUALITY	VALUE
★★★★★	★★★★★

**Overall** ★★★★★

**WE SAY:** Offering all the benefits of a full-frame sensor without the bulk, the A7 II has superb image stabilisation and produces high-quality images. It's well worth your attention.







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## Lenses and Accessories

Get kitted out with the best specialist lens for your camera, not too mention editing software, tripods, SD cards, and much more!

Own a camera and a kit lens is only the starting point for your photography. Sooner or later you'll find yourself wanting to expand the range of creative opportunities available to you. A new lens or accessory is a great way to do this.

In this section, we've included tests of telephoto and wide-angle lenses that can enable you to get closer to your subject or capture the full glory of a landscape. You'll also find tests of some of the most useful photographic accessories around, including tripods to help you get sharper and better quality images; filter systems and flashgun modifiers for greater exposure control; and sensor cleaners to get rid of any spots of dirt that could spoil your shots.

We've also got an in-depth review of the best image editing software around to help you decide what would suit you best. There's something for everyone!

### LENSES

#### Wide-angle prime lenses

116

Canon EF 24mm f/1.4L II USM  
Fujifilm Fujinon XF18mm f/2 R  
Nikon AF-S 24mm f/1.4G ED  
Nikon AF-S 28mm f/1.8G  
Olympus M.ZUIKO DIGITAL ED 12mm f/2  
Panasonic Lumix G 14mm f/2.5 ASPH II  
Pentax HD DA 15mm f/4 ED AL Limited  
Samyang 24mm f/1.4 ED AS IF UMC

#### Wildlife lenses

128

Canon EF 100-400mm f/4.5-5.6L IS USM  
Canon EF 400mm f/5.6L USM  
Nikon AF 80-400mm f/4.5-5.6D VR  
Nikon AF-S 80-400mm f/4.5-5.6G ED VR  
Panasonic 100-300mm f/4-5.6 Lumix G Vario  
Sigma 50-500mm f/4.5-6.3 DG OSHSM  
Sigma 150-500mm f/5-6.3 DG OSHSM  
Sony 70-400mm f/4-5.6 G SSM II

### ACCESSORIES

Image-editing software	140
Tripods	152
Sensor cleaners	154
Flashgun modifiers	156
Filter systems	158
White balance targets	160
SD cards	161





# Wide-angle primes

Wide angles and wide apertures abound as **Matthew Richards** puts eight prime cuts to the test



5



6

## THE CONTENDERS

- 1 Canon EF 24mm f/1.4L II USM £1,225 / \$1,650
- 2 Fujifilm Fujinon XF18mm f/2 R £400 / \$600
- 3 Nikon AF-S 24mm f/1.4G ED £1,465 / \$1,930
- 4 Nikon AF-S 28mm f/1.8G £495 / \$695
- 5 Olympus M.ZUIKO DIGITAL ED 12mm f/2 £560 / \$800
- 6 Panasonic Lumix G 14mm f/2.5 ASPH II £325 / \$395
- 7 Pentax HD DA 15mm f/4 ED AL Limited £430 / \$595
- 8 Samyang 24mm f/1.4 ED AS IF UMC £550 / \$550



7



1



8



3



2



4

From the makers of **Digital Camera** magazine



**M**any digital photographers reach for a wide-angle lens only when they've hit the stops on their standard zoom. Going wider has the benefit of being able to shoehorn more into the image. It's great for landscapes with big dramatic skies, and equally useful for interiors where you're physically constrained by the walls of a building. But there's more.

Wide-angle lenses are brilliant creative tools for exaggerating perspective. Move in really close to the main object in a scene, and the middle distance shrinks away at an alarming rate. The results can be truly eye-popping images. Environmental portraits are a particular favourite.

Bearing all this in mind, photographers often tend to use a wide-angle zoom at or near its shortest focal length. Maximising the viewing angle will naturally maximise the wide-angle effect – and, after all, that's why you switched from your standard zoom in the first place.

There's something to be said, therefore, for wide-angle lenses with a fixed focal length. Need a wider viewing angle than is available from your standard zoom? Just fit this on your camera instead. It's almost too easy – so it's rather bizarre that while there are plenty of wide primes for full-frame SLRs, there are practically none being manufactured for the vast majority of APS-C format SLR cameras. Fisheye optics aside, you're pretty much forced down the zoom lens route. One notable exception is the Pentax 15mm lens, one of the eight featured in this group test.

Shrink the size of the image sensor further still, and interesting

## Kit anatomy Little and large

**O**ne of the most obvious differences between the various lenses in this test group is their physical size. Some are big and heavy; others are tiny and amazingly lightweight. At one extreme, the Canon, Nikon and Samyang 24mm lenses are around 80mm in diameter and nearly 100mm in length, and weigh anything up to 650g. At the other, the dinky little Panasonic 14mm lens measures just 56x21mm and weighs next to nothing at 55g.

Generally speaking, the difference in size depends on two factors. First, the physically larger surface area of full-frame image sensors compared with APS-C and especially Four Thirds sensors means that the image circle created by the lens needs to be larger. Second, 'faster' lenses with wider available apertures need a front element that has a physically larger diameter, to let in more light.



Wide-angle primes feature diverse designs and sizes.

## “Need a wider viewing angle than is available from your zoom? Just fit this on your camera instead”

prime options start to re-appear, including the Olympus 12mm and Panasonic 14mm lenses, also on test. Taking the focal length multiplier, or crop factor, into account, the effective focal lengths of the Pentax, Olympus and Panasonic lenses work out to 22.5mm, 24mm and 28mm respectively. Meanwhile, Fujifilm's

APS-C based X-series compact system cameras (which have a 1.5x crop factor) are also well-supported with a growing range of X-mount wide primes, the 18mm edition of which is featured in our test.

### WHY PRIME?

If you're only using a wide-angle zoom lens at or near its shortest focal length, the versatility of having a zoom is largely lost. There's therefore no good reason for potentially degrading image quality by using a zoom instead of a prime. Indeed, we ran a group test of wide-angle zooms for crop-sensor cameras in issue 156, and found that they tended to suffer from pretty extreme barrel distortion at the short end of their zoom ranges. With the simplified design enabled by a fixed focal length, prime lenses typically deliver less noticeable distortions.

The next question is: how wide do you want to go? Most APS-C format wide-angle zooms have a focal length range of around 10–20mm, equivalent to 15–30mm on a full-frame camera. The prime lenses in this test tend to have an effective

## How we test lenses Advice you can trust

**O**ur lens tests are based on a two-stage procedure. Firstly, lab tests are carried out, shooting two test charts under controlled lighting conditions. The results are processed using Imatest Master, so that we can quantify optical performance in terms of sharpness, chromatic aberrations and distortion. Overall quality is

assessed at the centre, edges and corners of the images.

For real-world testing, we use each of the lenses under widely varying indoor and outdoor lighting conditions. Overall handling is checked, along with smoothness and precision of focus rings, and the operation of all switches. We also test the speed and accuracy of autofocus

systems, complete with operation of full-time manual override where available. Due to the wide angles of view enabled by these lenses, we also check for vignetting (darkened image corners), especially when using the widest available apertures. Ratings are finally given for features, build quality, image quality and value for money.

focal length (or actual focal length for full-frame compatible lenses) of 24mm or 28mm. In real terms, they therefore go no 'wider' than many standard zoom lenses at the short end of their zoom range. Ultimately, you're not gaining much in terms of outright viewing angle, if anything at all, by switching from a standard zoom to one of these wide-angle prime lenses.

However, along with a noticeable reduction in barrel distortion, compared with most standard zooms at their shortest focal length, there's another significant bonus in terms of speed. Most of the full-frame compatible primes in this test have a 'fast' widest available aperture of f/1.4 – the exception is the Nikon 28mm lens, which still offers a respectable f/1.8 widest aperture. Aperture widths are still impressive for most of the lenses designed for crop-sensor cameras, including the Fujifilm 18mm f/2, the Olympus 12mm f/2 and the Panasonic 14mm f/2.5. By contrast, the Pentax 15mm lens only has a widest available aperture of f/4 – three full f/stops slower than the f/1.4 lenses.

### WHY WIDE?

What's so important about a wider aperture anyway? The ability to reduce depth of field isn't normally a requirement for wide-angle lenses, although very wide apertures can still give the possibility of blurring the background when using these lenses at or near their shortest focus distances. A more popular benefit of wider apertures in wide-angle shooting is to enable faster shutter speeds for freezing action and for avoiding camera-shake. It can make a big difference in dull lighting conditions, and for handheld shooting indoors or at twilight, enabling sufficiently fast shutter speeds without having to push the camera's sensitivity settings too far.

In summary, then, wide-angle prime lenses should give excellent image quality and are useful for an incredibly diverse range of indoor and outdoor shooting requirements. As we'll see from the following individual reviews, however, features and image quality can vary considerably between competing lenses – and there's a big spread of prices as well.

### EQUIPMENT KNOW-HOW

## FEATURES TO LOOK FOR

Take a wider view when choosing your new lens

#### Focal length

Multiplying the actual focal length of each lens by the camera's crop factor (one for full-frame cameras) gives the effective focal length you can expect from the lens.

#### Distance scale

This is useful for setting the hyperfocal distance, at which everything from half that distance to infinity should be rendered sharp in images, to maximise depth of field.

#### Autofocus

Ring-type ultrasonic autofocus is generally quickest, while stepping motors give smooth, silent autofocus transitions for video capture. The Samyang is manual focus only.



#### Lens hood

A lens hood for reducing ghosting and flare from peripheral light is included with most of these lenses. There isn't one for the Panasonic, and it's an optional extra for the Olympus.

#### Control rings

Most lenses only feature a focus ring, but the Fujifilm and Samyang lenses also feature an aperture ring, which means the aperture can be set directly on the lens itself.

#### Attachment thread

Attachment thread sizes range from 46mm in the Olympus and Panasonic Micro Four-Thirds lenses, up to 77mm on the full-frame compatible 24mm f/1.4 lenses.

### Focus rings Explained

With the generous depth of field enabled by wide-angle lenses at medium to narrow apertures, a favourite trick is to focus about a third of the way into the scene. This approximates the hyperfocal distance, and should ensure that everything is sharp in the

resulting picture, from the foreground to the distant horizon. Although this trick helps for most types of shots, it's especially useful for landscapes. As a bonus, most of these lenses feature a focus distance scale with depth of field markings for various aperture settings.





## ° Canon EF 24mm f/1.4L II USM

£1,225 / \$1,650

A sequel for Canon's big wide prime

**T**he Mark II edition of this lens isn't merely a minor tweak, but represents a complete redesign. It boasts an extra two elements over its predecessor, taking the total number from 11 to 13, and its more rounded aperture is based on eight rather than seven diaphragm blades. As one of Canon's L-series (Luxury) lenses, it has professional-grade build quality and comes complete with weather seals. The latter isn't true of all L-series lenses.

Like the Nikon 24mm f/1.4 (see opposite page), the Canon lens is pricier than other lenses here. Further similarities include a particularly strong build, based on a metal rather than plastic barrel. There's a floating, fully internal focus system, powered by a ring-type ultrasonic autofocus mechanism.

Upmarket glass includes two aspherical elements to guard against spherical aberrations (common in wide-aperture lenses) and two Super UD (Ultra-low Dispersion) elements to correct lateral chromatic aberrations.

### PERFORMANCE

While a wide f/1.4 aperture is great to have, image quality is unimpressive at this setting. Vignetting is pronounced, and there's a distinct lack of sharpness towards the edges and corners of the frame. Our review sample also suffered from a front-focus issue during autofocus, although this was effectively bypassed in Live View mode. For the best image quality with this lens, stick to apertures between f/4 and f/8.



**Tech focus...**  
13 elements in 10 groups; 8 diaphragm blades; closest focus distance, 25cm; 77mm filter thread; ring-type ultrasonic autofocus; 80 x 87mm; 650g

**Digital Camera**

**FEATURES**  
★★★★★  
**BUILD QUALITY**  
★★★★★  
**IMAGE QUALITY**  
★★★★★  
**VALUE**  
★★★★★

**OVERALL**  
★★★★★

## Fujifilm Fujinon XF 18mm f/2 R

£400 / \$600

Part of a growing range from Fujifilm

**F**ujifilm's acclaimed X-series of CSCs is supported by an diverse range of wide-angle prime lenses. These include 14mm, 18mm, 23mm and 27mm options, and a 16mm lens is due in 2015. Thanks to the X-series cameras' 1.5x crop factor, this 18mm lens has an effective focal length of 27mm, along with a reasonably fast widest aperture of f/2.

The retro styling of the lens is a perfect match for cameras like the Fujifilm X-T1. As a 'pancake' lens, it's physically short at 41mm, and comes with an aperture ring that's calibrated in 1/3-click stops.

Build quality is impressive. The lens has a solid metal barrel and mounting plate, although it's not weather-sealed. Focusing isn't internal and the lens extends physically through the focus range but the front element doesn't rotate, easing the use of filters like circular polarisers and ND grads. Although there's no focus distance scale or depth of field markings on the lens itself, this information is presented in the shooting display of the X-T1, which we used for testing.

### PERFORMANCE

There's impressively little vignetting, even when shooting wide open. Autofocus is accurate and fairly speedy, and the image quality is good overall. However, the image corners could be a bit sharper at any given aperture. They also suffer a little from colour fringing at medium-to-narrow apertures.



**Tech focus...**  
8 elements in 7 groups; 7 diaphragm blades; closest focus distance, 18cm; 52mm filter thread; micro-motor autofocus; 65 x 41mm; 116g

**FEATURES**  
★★★★★  
**BUILD QUALITY**  
★★★★★  
**IMAGE QUALITY**  
★★★★★  
**VALUE**  
★★★★★

**OVERALL**  
★★★★★



## Nikon AF-S 24mm f/1.4G ED

£1,465 / \$1,930

A big lens with a big price tag

**T**he direct equivalent to the Canon 24mm lens (see opposite page), this is Nikon's top-dollar f/1.4 optic for full-frame cameras, and it's the most expensive lens in the group. Pro build quality includes a magnesium barrel and weather-sealed mounting plate. The design uses one less element than the Canon, and the diaphragm has nine blades rather than eight. Aspherical and ED (Extra low Dispersion) elements are utilised.

As a 24mm f/1.4 lens with full-frame compatibility, it's typically chunky, being marginally bigger and very slightly lighter than the competing Canon. Similarities include fast and near-silent ring-type ultrasonic autofocus, and a neat focus scale positioned beneath a viewing window on the top of the lens barrel. Focusing is completely internal but, while both lenses feature a depth of field scale, the Nikon's isn't quite as clear or as well implemented as that of the Canon.

### PERFORMANCE

Centre-sharpness is excellent, even at very wide apertures, and levels of sharpness are maintained well, even into the extreme corners of the image frame. The Nikon performs very much better than the Canon in this respect, while also managing to keep vignetting down to lower levels.

Colour fringing is also better controlled, throughout the aperture range. All in all, it's a very pricey lens, but the adage that you get what you pay for certainly applies here.



**Tech focus...**  
12 elements in 10 groups; 9 diaphragm blades; closest focus distance, 25cm; 77mm filter thread; ring-type ultrasonic autofocus; 83 x 89mm; 620g



## Nikon AF-S 28mm f/1.8G

£495 / \$695

What a difference a stop makes

**T**his lens is two-thirds of a stop slower than the Nikon 24mm lens to the left. But it costs just one third of the price, making it a much more affordable proposition. Along with the reduced wide-aperture ability, there's a reduction in the angle of view. Even so, the 28mm focal length gives a viewing angle of 75 degrees (measured on the diagonal) when used on a full-frame camera, compared with the 84 degrees of a 24mm lens. As such, it's still a usefully wide lens for indoor and outdoor shooting alike, but loses out to the more generous wide-angle abilities of a typical 24–70mm standard zoom lens.

Barrel construction is based on high-quality plastics rather than magnesium alloy. The lens doesn't feel as robust as the Canon or Nikon 24mm lenses, but it's well-made nonetheless. There are two aspherical elements, plus the application of Nano Crystal Coat and a weather-sealed mounting plate, but there are no ED (Extra low Dispersion) elements.

### PERFORMANCE

Nikon's ring-type ultrasonic autofocus system is every bit as fast here as in the company's more exotic 24mm lens and, as usual, it comes complete with full-time manual override. The manual focus ring is even larger than on the Nikon 24mm and equally smooth and precise in operation. Vignetting is more noticeable at the widest available aperture and sharpness isn't quite as impressive, but overall image quality is very good.



**Tech focus...**  
11 elements in 9 groups; 7 diaphragm blades; closest focus distance, 25cm; 67mm filter thread; ring-type ultrasonic autofocus; 73 x 81mm; 330g







# ° Olympus M.Zuiko Digital Ed 12mm f/2

£560 / \$800

A compact lens with a touch of class

**T**ypical of Olympus-made Micro Four Thirds lenses, this one is physically quite small but nicely engineered. It's from the Premium range of Olympus lenses and is available in silver or black, featuring a stylish but tough metal barrel that plays host to 11 elements. Specialist elements include one aspherical, one DSA (Dual Super Aspherical), one ED (Extra-low Dispersion) and one Super HR (High Refractive). ZERO (Zuiko Extra-low Reflection Optical) coatings reduce ghosting and flare. However, the lens' rectangular hood has to be purchased separately – and it's not cheap at nearly £60. Autofocus comes courtesy of a Movie Stills Compatible system that's smooth and silent in operation. Akin to many Tokina lenses, the manual focus ring has a push-pull clutch or 'snapshot' mechanism, as Olympus calls it, which enables you to pull back the focus ring to switch from autofocus to manual focus. This action also reveals a focus distance scale printed on the barrel that ties in with a depth of field scale, listing apertures between f/5.6 and f/22.

**PERFORMANCE**

Autofocus is rapid for stills and enables smooth focus transitions during video capture. The electronic 'fly-by-wire' manual focusing mechanism operates with precision. Sharpness is both good and even across the whole image frame, right into the corners, even at the widest aperture of f/2. Vignetting is noticeable at this aperture, but becomes less of an issue at f/2.8.



**Tech focus...**  
11 elements in 8 groups; 7 diaphragm blades; closest focus distance, 20cm; 46mm filter thread; stepping motor autofocus; 56 x 43mm; 130g

**Digital Camera**

**FEATURES**  
★★★★★  
**BUILD QUALITY**  
★★★★★  
**IMAGE QUALITY**  
★★★★★  
**VALUE**  
★★★★★

**OVERALL**  
★★★★★

# Panasonic Lumix G 14mm f/2.5 Asph II

£325 / \$395

A singularly low-fat pancake lens

**S**o-called pancake lenses have been around for more than a century. While they're available for some SLRs, they've become particularly popular for CSCs. The ultra-short lens barrel design is in keeping with the design philosophy of slimline mirrorless cameras. Even so, this lens takes pancake design to the extreme. It's a mere 21mm in length and a real featherweight at just 55g. To put that into perspective, the Canon 24mm lens on test is about 12 times heavier. As you'd expect in such a small, light lens, the construction is quite simple. There are only six elements, which is about half as many as in most competing lenses. Build quality feels pretty good, however, with a metal mounting plate and a sturdy plastic barrel. By necessity, the focus ring is very narrow, but the fly-by-wire manual focusing mechanism works well, as does the fast and silent autofocus system.



**Tech focus...**  
6 elements in 5 groups; 7 diaphragm blades; closest focus distance, 18cm; 46mm filter thread; stepping motor autofocus; 56 x 21mm; 55g

**PERFORMANCE**

Naturally, the viewing angle isn't quite as great as from the Olympus 12mm (left), the other MFT lens on test. The Panasonic has an effective focal length of 28mm rather than the Olympus's 24mm, in full-frame terms. However, the Panasonic is sharper than the Olympus, both at the centre of the frame and into the corners, throughout the aperture range. There's also much less vignetting when shooting wide-open. Barrel distortion is also less noticeable. Overall, it's a cracking little lens that's also great value.

**Digital Camera**

**FEATURES**  
★★★★★  
**BUILD QUALITY**  
★★★★★  
**IMAGE QUALITY**  
★★★★★  
**VALUE**  
★★★★★

**OVERALL**  
★★★★★



APS-C Pentax K



FULL-FRAME Canon EF Four Thirds Nikon F Pentax K Samsung NX Sony A Sony E

## Pentax HD DA 15mm f/4 ED AL Limited

£430 / \$595

It certainly looks the business

**T**he current vogue for retro design in cameras and lenses hasn't been lost on Pentax. Drawn from its Limited range of lenses, this 15mm optic drips with yesteryear charm. It's beautifully engineered, with a barrel and screw-in front cap made from hand-machined aluminium. Inside, there are aspherical element and ED (Extra-low Dispersion) elements, plus Pentax's new HD coating to reduce ghosting and flare while increasing light transmittance.

Taking the 1.5x crop factor of Pentax APS-C format SLRs into account, this lens has the widest viewing angle of any in the test group, at 86 degrees. However, it's certainly not a 'fast' prime lens. Its widest available aperture of f/4 is three stops slower than the f/1.4 lenses, and two stops slower than an f/2 lens.

The autofocus system is nothing to get excited about. Driven from a motor in the camera body, it's quite rapid but distinctly noisy. Handling is impaired by the manual focus ring rotating during autofocus, but at least full-time manual override is available.

### PERFORMANCE

Given that this lens offers the widest viewing angle in the group, it's a real achievement that it also delivers the joint-least distortion, along with the Canon 24mm. There's little vignetting, even at the modest widest aperture of f/4. At apertures narrower than f/11, however, the image quality is let down by poor sharpness towards the edges and corners of the frame.



**Tech focus...**  
8 elements in 6 groups; 7 diaphragm blades; closest focus distance, 18cm; 49mm filter thread; autofocus driven from camera; 63 x 40mm; 189g



## Samyang 24mm f/1.4 ED AS IF UMC

£550 / \$550

Let's switch to manual

**T**ypically of Samyang lenses, this 24mm design looks like a bit of a throwback. In an age of automation, it takes the path less travelled, with a manual focus system and an aperture ring. So, while most competing lenses can autofocus in a jiffy, and work perfectly well in Program AE and Shutter Priority shooting modes, this one slows you down and keeps your left hand busy.

That said, things are a little more refined in the Nikon-fit edition of the lens. Electronics are added so that the aperture can be controlled from the camera (essential in some SLRs), and focus assistance and confirmation lamps are enabled in the viewfinder display.

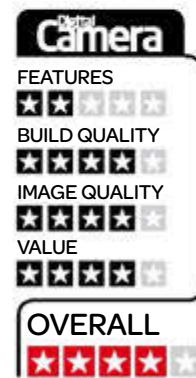
The relatively large depth of field generated by a 24mm lens means focus accuracy isn't that critical. The lack of autofocus is therefore less of an issue in this lens than with, say, a standard or telephoto optic. A clear plus point is that the large manual focus ring of the Samyang is wonderfully smooth, comfortable and precise in operation, so manual focusing certainly isn't the chore you might expect it to be.

### PERFORMANCE

The Samyang makes the most of its two aspherical elements, four ED elements and UMC coatings to deliver pleasing image quality. The only negative is that sharpness is a little poor at apertures between f/1.4 and f/2.8, but it's no worse at the corners of the frame than at the centre. Vignetting is also noticeable at f/1.4, but no more so than with the Canon lens.




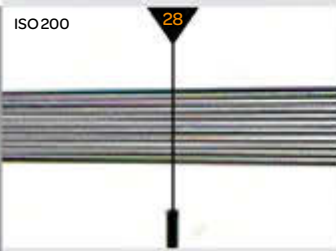
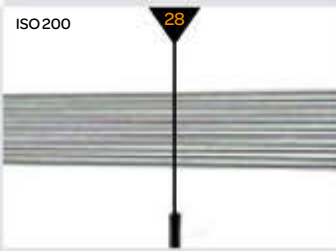
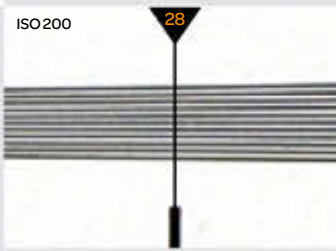
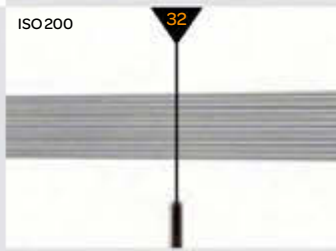












**Tech focus...**  
13 elements in 12 groups; 8 diaphragm blades; closest focus distance, 25cm; 77mm filter thread; manual focus only; 83 x 98mm; 580g





# IMAGE QUALITY IN FOCUS

	CANON EF 24MM F/1.4L II USM	FUJIFILM FUJINON XF 18MM F/2 R	NIKON AF-S 24MM F/1.4G ED	NIKON AF-S 28MM F/1.8G
				
SHARPNESS TEST	ISO 200 	ISO 200 	ISO 200 	ISO 200 
	Despite being one of the priciest lenses in the group, sharpness is unimpressive, especially away from the centre of the frame.	Centre-sharpness is pretty good even at f/2, but sharpness could be a bit better in the corners, throughout the aperture range.	The upmarket Nikon option is super-sharp, even at its widest aperture of f/1.4, right across the whole image frame.	It's not quite as sharp as Nikon's flagship 24mm lens, but still does well to maintain good sharpness into image corners.
FRINGING TEST				
	Colour fringing from this Canon lens is more noticeable than with either of the Nikon lenses, the Panasonic or the Samyang.	There's very little fringing at f/2 with the Fujinon, but it becomes worse than in competing lenses at medium-to-narrow apertures.	There's almost no colour fringing to be seen, lab scores remaining ultra-low throughout the entire aperture range.	As with the Nikon and Samyang 24mm lenses, colour fringing is essentially a non-issue with this 28mm lens.
DISTORTION TEST				
	Barrel distortion is well restrained and, in this respect, the Canon is a joint leader amongst the group, along with the Pentax 15mm lens.	The Fujinon is better than most lenses for giving low distortion, but not quite as good as the Canon, Panasonic and Pentax lenses.	Barrel distortion is a little more noticeable than from any other lens in the group, but it's still not bad, considering the big angle of view.	Along with its more modest viewing angle, compared with Nikon's 24mm lens, comes a reduction in the amount of barrel distortion.
IMAGE TEST VERDICT	Sharpness is unimpressive at the centre and disappointing towards the edges and corners. We'd expect better from a lens at this price.	Corner-sharpness isn't great and colour fringing is worse than average but the overall image quality from the Fujinon is pretty good.	The Nikon 24mm's image quality is absolutely excellent, and fully in keeping with the lens's professional-grade build and high asking price.	Wide-aperture vignetting is more noticeable than in Nikon's 24mm lens and it's not quite as sharp, but image quality is very good overall.
				

OLYMPUS M.ZUIKO DIGITAL  
ED 12MM F/2



ISO 200

28



A close match to the Nikon 24mm lens in terms of sharpness, the Olympus isn't quite as sharp as the Panasonic 14mm.



Levels of colour fringing are about average for this class of lens, and of similar amounts to the Canon 24mm and Pentax 15mm lenses.



There's a little more barrel distortion here than from the Panasonic 14mm lens, but the viewing angle is considerably wider.

### IMAGE TEST VERDICT

The Olympus acquits itself well in nearly all areas of build quality, although vignetting is very noticeable at the widest f/2 aperture.

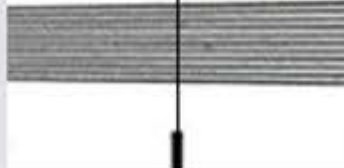


PANASONIC LUMIX G  
14MM F/2.5 ASPH II



ISO 200

26



One of the sharpest lenses in the entire group, the tiny Panasonic pancake lens is particularly impressive at its widest aperture.



Colour fringing is very well-controlled – almost to the same degree as in the Nikon and Samyang lenses in the group.



Better than average, the Panasonic gives less barrel distortion than most other lenses on test, apart from the Canon and the Pentax.

### IMAGE TEST VERDICT

The Panasonic 14mm is a tiny and incredibly lightweight lens, but performance is really excellent when it comes to image quality.

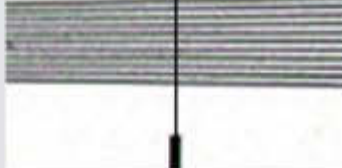


PENTAX DA  
15MM F/4 ED AL



ISO 200

24



Centre-sharpness is good, but you need to narrow the aperture all the way to f/11 for decent sharpness in image corners.



Results for colour fringing are pretty average, and quite similar to the Canon 24mm and Olympus 12mm lenses on test.



Considering that the Pentax gives the widest viewing angle of any lens in the group, the minimal barrel distortion is impressive.

### IMAGE TEST VERDICT

Image quality is very good in most respects, but the lack of sharpness towards the edges and corners of images spoils the party somewhat.

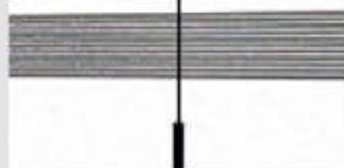


SAMYANG 24MM  
F/1.4 ED AS IF UMC



ISO 200

32



Sharpness takes a dive at wide apertures between f/1.4 and f/2.8 but, apart from that, there's plenty of detail across the whole frame.



There's very little colour fringing which is essentially impossible to spot in the majority of images, even towards the corners.



A little higher than average, the Samyang still gives less barrel distortion than the competing Nikon 24mm lens.

### IMAGE TEST VERDICT

Apart from a lack of sharpness at very wide apertures, the image quality is very convincing from this Samyang lens, making it very good value.



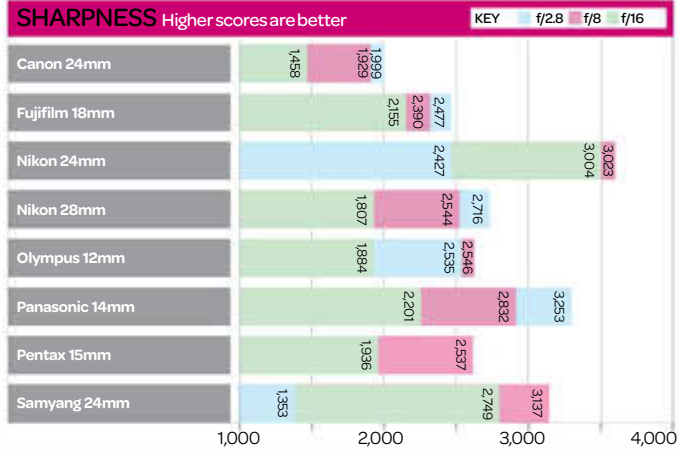


WHAT'S THIS?  
Find out how we test on page 6

LENS BENCHMARKS  
How the lenses fare in our lab tests

Most lenses in the group give an 'effective' focal length of either 24mm or 28mm in full-frame terms, with a viewing angle of about 84 degrees or 75 degrees respectively. The Pentax is a little wider, equivalent to a 22.5mm lens with a viewing angle of 86 degrees. Barrel distortion isn't necessarily more pronounced for lenses that have wider viewing angles. Similarly, lenses with narrower viewing angles don't necessarily perform better in terms of sharpness or colour fringing.

Some lenses struggle to deliver high levels of sharpness across the entire image frame, especially at their widest aperture settings. The Pentax lens in particular has problems with this, despite having the narrowest maximum aperture of any lens in the group, at f/4. Overall sharpness tends to peak at medium apertures of around f/5.6 to f/11, dropping off at f/16 due to diffraction, which is entirely normal at narrow apertures.



The Nikon 24mm and Panasonic 14mm lenses are particularly impressive for sharpness, but the pricey Canon 24mm is comparatively lacklustre.



The Canon 24mm and Pentax 15mm lenses do best at minimising barrel distortion, despite offering some of the widest viewing angles in the group.

FRINGING Lower scores are better

	f/2.8	f/8	f/16
Canon 24mm	1.42	1.54	1.6
Fujifilm 18mm	0.89	2.87	3.07
Nikon 24mm	0.23	0.29	0.33
Nikon 28mm	0.36	0.37	0.2
Olympus 12mm	1.41	1.67	1.72
Panasonic 14mm	0.46	0.64	0.79
Pentax 15mm	N/A	1.5	1.59
Samyang 24mm	0.39	0.18	0.21

The Nikon 24mm and 28mm lenses lead the way for controlling colour fringing, along with the Samyang 24mm lens.

HOW THE LENSES COMPARE

	Canon EF 24mm f/1.4L II USM	Fujifilm Fujinon XF18mm f/2 R	Nikon AF-S 24mm f/1.4G ED	Nikon AF-S 28mm f/1.8G	Olympus M.ZUIKO DIGITAL ED 12mm f/2	Panasonic Lumix G 14mm f/2.5 ASPH II	Pentax HD DA 15mm f/4 ED AL Limited	Samyang 24mm f/1.4 ED AS IF UMC
Contact	www.canon.co.uk	www.fujifilm.co.uk	www.nikon.co.uk	www.nikon.co.uk	www.olympus.co.uk	www.panasonic.com/uk	www.pentax.co.uk	www.samyang.co.uk
Street Price	£1,225 / \$1,650	£400 / \$600	£1,465 / \$1,930	£495 / \$695	£560 / \$800	£325 / \$395	£430 / \$595	£550 / \$550
Mount options	EF	X	FX	FX	MFT	MFT	K	EF FT F K NX A E
Autofocus motor	Ultrasonic (ring)	Micro-motor	Ultrasonic (ring)	Ultrasonic (ring)	Stepping motor	Stepping motor	None (via camera drive)	None (manual focus only)
Minimum focus distance	25cm	18cm	25cm	25cm	20cm	18cm	18cm	25cm
Viewing angle range	84 degrees	76.5 degrees	84 degrees	75 degrees	84 degrees	75 degrees	86 degrees	84 degrees
Filter size	77mm	52mm	77mm	67mm	46mm	46mm	49mm	77mm
Lens hood	Yes	Yes	Yes	Yes	Optional extra	No	Yes	Yes
Dimensions (DxL)	80x87mm	65x41mm	83x89mm	73x81mm	56x43mm	56x21mm	63x40mm	83x98mm
Weight	650g	116g	620g	330g	130g	55g	189g	580g
FEATURES	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
BUILD QUALITY	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
IMAGE QUALITY	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
VALUE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OVERALL	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

KEY: EF Canon EF X Fujifilm X F Nikon F FX Nikon FX FT Four Thirds MFT Micro Four Thirds K Pentax K NX Samsung NX A Sony A E Sony E



## THE DIGITAL CAMERA VERDICT

# OPEN WIDE AND SAY NIKON

Nikon's AF-S 24mm f/1.4G ED wins out for image quality

**S**pend top dollar on a top-flight professional lens, and you expect top performance. But it doesn't always work out that way. By some margin, the two priciest competitors in this group are the Canon and Nikon 24mm f/1.4 lenses. Both have rock-solid build quality, are reassuringly hefty, and deliver fast and whisper-quiet autofocus.

However, while the Nikon delivers simply sublime image quality throughout its entire

aperture range, the Canon just doesn't. There's a lack of sharpness at the centre of the image, and sharpness is a let-down towards the edges and corners of images, especially at wide apertures. The Nikon is also much better at avoiding vignetting at wide apertures.

All in all and money no object, the Nikon 24mm f/1.4 is a clear winner. On a more restrained budget for SLR wide primes, the Samyang 24mm gives good image quality if

you can live without autofocus, and the Nikon 28mm is nice if you don't need a really wide viewing angle.

The tiny Panasonic 14mm pancake lens is the cheapest in the group – yet it manages to deliver superb image quality and is a great buy for Micro Four Thirds cameras. The Olympus 12mm is a beautifully engineered MFT lens that gives an even wider angle of view and good image quality, although it's somewhat larger and more expensive. 



NIKON AF-S 24MM F/1.4G ED

£1,465 / \$1,930

**What's good:** Superb pro-grade build quality; excellent image quality; great handling.

**What's bad:** Heavy and expensive.

**We say:** A top-class lens that delivers the best overall image quality in the group.



PANASONIC LUMIX G 14MM F/2.5

ASPH II £325 / \$395

**What's good:** Unfeasibly tiny and light, but with spectacular image quality.

**What's bad:** Angle of view isn't as wide as in the competing Olympus 12mm MFT lens.

**We say:** Great lenses don't have to be huge.



FUJIFILM FUJINON XF18MM F/2 R

£400 / \$600

**What's good:** Smart retro design; hands-on aperture ring; compact pancake design.

**What's bad:** A little soft around the edges at wide apertures.

**We say:** A worthy addition to Fujifilm's XF series of prime lenses, and good value.



NIKON AF-S 28MM F/1.8G

£495 / \$695

**What's good:** Very pleasing image quality; smaller and lighter than the Nikon 24mm.

**What's bad:** Vignetting at f/1.8; build quality is a step down from the Nikon 24mm.

**We say:** It's an impressive, modestly sized full-frame compatible lens at a sensible price.



OLYMPUS M.ZUIKO DIGITAL ED

12MM F/2 £560 / \$800

**What's good:** Beautifully engineered metal barrel; wide angle of view in a small build.

**What's bad:** Not as sharp as the Panasonic 14mm; wide-aperture vignetting.

**We say:** More expensive than the Panasonic 14mm, but the greater viewing angle sells it.





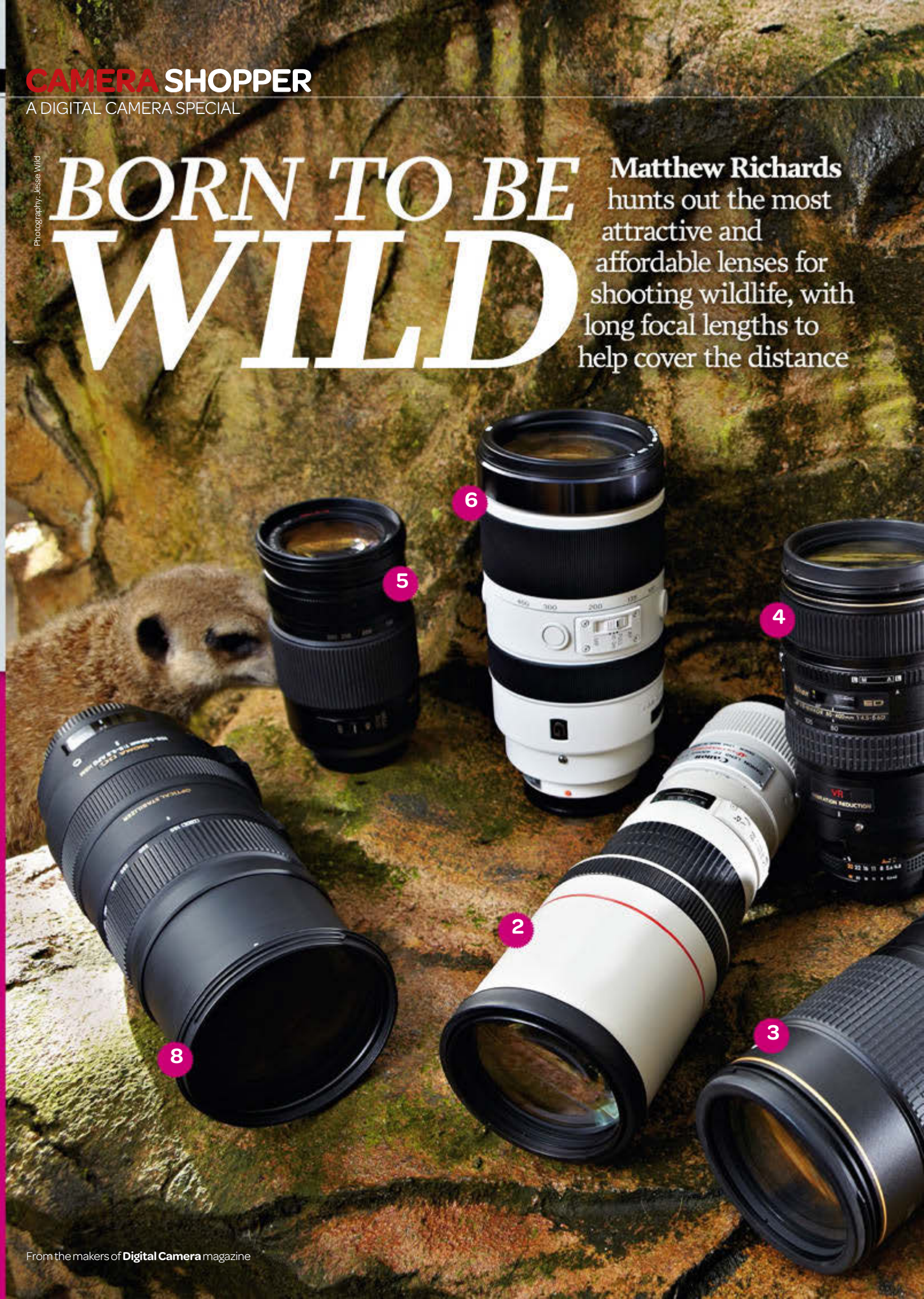
Photography: Jesse Wild

# BORN TO BE WILD

Matthew Richards hunts out the most attractive and affordable lenses for shooting wildlife, with long focal lengths to help cover the distance

Cameras

Lenses and Accessories







## THE ENTRY LIST

- 1 Canon EF 100-400mm f/4.5-5.6L IS USM, £1,280
- 2 Canon EF 400mm f/5.6L USM, £1,130
- 3 Nikon AF 80-400mm f/4.5-5.6D VR, £940
- 4 Nikon AF-S 80-400mm f/4.5-5.6G ED VR, £2,000
- 5 Panasonic 100-300mm f/4-5.6 Lumix G Vario, £420
- 6 Sigma 50-500mm f/4.5-6.3 DG OS HSM, £1,000
- 7 Sigma 150-500mm f/5-6.3 DG OS HSM, £730
- 8 Sony 70-400mm f/4-5.6 G SSM II, £1,800

## MOUNT KEY



See which lens is available for your camera with this handy key.

C: Canon mount; N: Nikon; 4/3: Four Thirds; P: Pentax; S: Sony; Sg: Sigma

## SPECIAL AWARDS



To make this test as relevant as possible, we've created a special award to tell you which lens is best for each camera system



**W**ildlife is wild by definition. A long lens, helping you maintain a respectful distance, is all but essential. Depending on what creatures you're photographing, you'll be able to get your shots without scaring them away or getting eaten in the process.

Going a step further than budget 70-300mm lenses, super-telephotos typically have focal lengths of 400mm, 500mm or even longer. If you happen to be sitting on a small fortune, there are some seriously upmarket lenses to choose from. Prominent examples include the latest Nikon and Canon 500mm f/4 lenses, which cost an eye-watering £6,000 and £8,000 respectively. For an even more bonkers amount of money, there's the zooming Canon EF 200-400mm f/4L IS USM with Internal 1.4x Extender, at £10,500.

To keep the choice down to earth, we've set a limit of £2,000 for the lenses in this group test – including a few at less than half that price.

THE CROP FACTOR

Compared with monster prime and zoom lenses, all the models on test are manageable enough for at least short bursts of handheld shooting. In most cases, however, a tripod or monopod helps to bear the load for extended sessions. As such, all the lenses on test (apart from the Panasonic) come complete with a tripod mounting collar and foot. These are good not only for balancing relatively heavy lens and camera combinations, but also retain the balance in portrait orientation (upright) shooting.

All the lenses on test (again, apart from the Panasonic) are full-frame compatible. However, the crop factor of APS-C cameras gives a boost in telephoto shooting. For example, on a Nikon, Pentax or Sony body, the 1.5x crop factor delivers an effective focal

Shop smart **New Tamron telephoto**

**O**n sale for around £950, the Tamron SP 150-600mm f/5-6.3 Di VC USD is an intriguing newcomer in the super-telephoto market. Tamron was unable to supply a review sample for this group test, but here are the highlights. As with most of the lenses on test, it's

compatible with full-frame bodies, but goes that bit further to 600mm at the long end of the zoom range. Other attractions include ring-type ultrasonic autofocus and Tamron's proprietary Vibration Compensation optical stabilisation system. Size

and weight are similar to the Sigma 150-500mm lens at 105x258mm and 1.95kg, although the lens' filter attachment thread is bigger at 95mm.

It's available in Canon, Nikon and Sony mount options, the last of which omits the optical stabiliser.



The new Tamron SP weighs in at just under 2kg with the tripod mount attached

“All the models on test are manageable enough for at least short bursts of handheld shooting”

length of 750mm when using a 500mm lens. There's an even greater effective reach on Canon bodies, equating to 800mm.

The Panasonic lens is a Micro Four Thirds format optic, cameras in this system having a 2.0x crop factor. We've therefore included the relatively tiny, lightweight Panasonic 100-300mm lens in the test group, as it gives an effective reach of up to 600mm. All of the lenses on test are

With thanks...

To Exmoor Zoo for allowing us to take our opening image there. If you'd like to get up close with some of the animals, this is the place to go! Go to [www.exmoorzoo.co.uk](http://www.exmoorzoo.co.uk) for info

zooms, apart from the Canon 400mm f/5.6L prime lens.

HOW FAST?

When you're after a long super-telephoto lens at a sensible price, size and weight, one thing you won't get is a particularly wide maximum aperture. Most are limited to f/5.6 at the long end of the zoom range, apart from the two Sigma lenses which are slightly narrower still, at f/6.3. To enable reasonably fast shutter speeds, often needed to freeze action in wildlife photography, you can find yourself having to use the widest available aperture, even when bumping up the camera's ISO setting.

How we test lenses **Advice you can trust**

**O**ur lens tests are based on a two-stage procedure. First, lab tests are carried out, shooting two test charts under controlled lighting conditions. The results are processed using Imatest Master, so that we can quantify optical performance in terms of sharpness, chromatic aberrations and

distortion. Overall quality is assessed at the centre, edge and corners of the images.

We then use each of the lenses under widely varying indoor and outdoor lighting conditions. Handling is checked, along with smoothness and precision of zoom and focus rings, and the operation of all switches.

We also test the speed and accuracy of autofocus systems. The effectiveness of optical stabilisation systems, where fitted, is checked by gradually reducing shutter speeds during handheld shooting. Ratings are finally given for features, build quality, image quality and value for money.

The 'wide-open' performance of this type of lens is therefore an important factor, as you may not get the luxury of narrowing the aperture by a stop or two to optimise image quality.

Camera-shake is another inherent problem when using long lenses. The rule of thumb is that the shutter speed should be at least the reciprocal of the focal length. With an effective focal length of 800mm, you'd therefore need a shutter speed of 1/800 second or faster for consistently sharp handheld shots. To improve matters when shooting handheld or even using a monopod, many lenses in this group feature optical stabilisation. In other cases, anti-shake aid is left to sensor-shift stabilisation in the camera body, or isn't available at all.

## SHARP SHOOTING

Mirror-bounce is another factor that can zap sharpness in super-telephoto shooting with conventional SLRs. It's the same problem as when using a macro lens for extreme close-ups: the jarring action of the mirror flipping up can unsettle the camera, particularly when using a tripod, and even the slightest movement can have a major effect.

Using an exposure delay mode or mirror lockup function is an effective solution, but only really practical if you're photographing wildlife that isn't moving around, or you're trying to capture a definitive moment. Fast shutter speeds are usually a better remedy.

Speed is also an issue when it comes to autofocus. When you only have the briefest of moments to acquire focus, or you need to track moving animals, fast autofocus is a must. Ring-type ultrasonic autofocus generally has the best reputation for speedy performance, but it's not the full story.

Another big contributing factor is how the internal lens elements are moved during focusing. Inner-focus systems where the smaller, rear elements are moved tend to be much quicker than those in which the relatively big and heavy front elements are moved. This is especially true for big telephoto lenses. In this test group, all lenses have an inner, rear-focusing design, apart from the older D-mount edition of the Nikon 80-400mm VR.

## EQUIPMENT KNOW-HOW

# FEATURES TO LOOK FOR

Keep an eye on the specifications when buying

### Zoom or prime?

In this price bracket, zoom lenses are much more widely available than prime lenses. The versatility of a zoom is good to have, especially if you're limited to a fixed shooting position.

### Size and weight

Super-telephoto lenses tend to be quite big and weigh up to 2kg. The physical length generally extends considerably when using the lens towards the long end of its zoom range.

### Optical stabilisation

Newer generations of optical stabiliser are often about one f/stop more effective than older designs. Many of them feature automatic or manually selected panning modes.



### Wide apertures

None of the zoom lenses in this test group has a constant-aperture design. The widest available aperture typically shrinks from f/4 or f/4.5 at the short end to f/5.6 or f/6.3 at the long end.

### Weather seals

Weather seals are absent from nearly all of the lenses in this group test, which can be an issue when it comes to wildlife photography. The newer Nikon 80-400mm G-mount lens is best in this respect.

### Autofocus system

Most of the lenses in this group feature ring-type ultrasonic autofocus. The exceptions to this are the Panasonic which has a stepping motor, and the older Nikon 80-400mm D-mount edition.

## Explained Teleconverters

One way to boost telephoto reach even further is to fit a teleconverter. Popular options give a 1.4x or a 2.0x magnification of focal length. However, these reduce the widest available aperture by one or two f/stops respectively. Given that many cameras can't

autofocus with a widest available aperture of f/8 or narrower, it means you'll often be limited to manual focus only. Most budget 70-300mm telephoto zoom lenses are incompatible with teleconverters, because the rear element isn't sufficiently recessed within the lens barrel.





# ° CANON EF 100-400MM F/4.5-5.6L IS USM £1,280

A rather oddball and dated design

**O** riginally launched in 1998, the EF 100-400mm foregoes a zoom ring in favour of a trombone-style push/pull design. You simply push the outer barrel of the zoom ring forwards to increase the focal length, and pull it backwards for reduction. It works reasonably well in practice, although some care is needed not to adjust the zoom setting accidentally during handheld shooting, especially when panning. At least there's an additional ring for adjusting the friction of the mechanism, which also helps to avoid zoom creep in tripod-mounted shooting.

This lens isn't weather-sealed, but overall build quality feels robust. An early generation of image stabiliser is rated at three stops, and features a panning mode that can be manually selected via a switch on the barrel. There's also a focus limiter switch, which locks out the short end of the range between 1.8 and 6.5 metres.

Quality glass includes top-grade fluorite and Super UD (Ultra-low Dispersion) elements. There are eight blades, which help to give a well-rounded diaphragm to enhance bokeh.

## PERFORMANCE

As is typical in Canon's L-series telephoto lenses, autofocus is fast and accurate. The image stabiliser gave only a two-stop advantage in our tests, so is therefore rather less effective than in some of the more recent stabilised lenses. Image quality is very good, with impressive sharpness and contrast throughout the entire zoom range, even at the widest available apertures.



**Tech focus...**  
17 elements in 14 groups, 8 diaphragm blades, closest focus distance 180cm, 77mm filter thread, ring-type ultrasonic autofocus, physical dimensions 92x189mm, weight 1,380g

**Digital Camera**

FEATURES  
★★★★★

BUILD QUALITY  
★★★★★

IMAGE QUALITY  
★★★★★

VALUE  
★★★★★

OVERALL  
★★★★★

# CANON EF 400MM F/5.6L USM £1,130

A prime lens with a long heritage

**T** he only prime lens here, the Canon 400mm is also the oldest, with a design that stretches back over 20 years. You could argue that Canon is taking an 'if it ain't broke, don't fix it' approach, but the lens would benefit from an update.

It lacks the weather seals of most recent L-series lenses, and the lack of image stabilisation is a disadvantage, especially given that the widest available aperture isn't exactly fast at f/5.6. On the plus side, while Canon often doesn't supply lens hoods with its lenses, this one has a built-in retractable hood that makes it impossible to lose.

Extras include a tripod mounting collar and foot, a distance scale under a viewing window, and an AF/M focus mode switch. As with ring-type ultrasonic systems in other lenses, full-time manual override is available in One Shot autofocus mode. A focus limiter switch is also fitted to omit the short end of the focus range, between 3.5 and 8.5 metres. The large focus ring is smooth, precise and well-positioned.

## PERFORMANCE

Despite being a prime lens, sharpness is no better than from Canon's EF 100-400mm zoom lens at the latter's longest zoom setting, although it exhibits less distortion and colour fringing. Even so, it's still one of the sharpest lenses in the group at this focal length. Autofocus is quick and near-silent. Overall, it's an attractive buy if you can live without stabilisation or the versatility of a zoom lens.



**Tech focus...**  
7 elements in 6 groups, 8 diaphragm blades, closest focus distance 350cm, 77mm filter thread, ring-type ultrasonic autofocus, physical dimensions 90x257mm, weight 1,250g

**Digital Camera**

FEATURES  
★★★★★

BUILD QUALITY  
★★★★★

IMAGE QUALITY  
★★★★★

VALUE  
★★★★★

OVERALL  
★★★★★



## NIKON AF 80-400MM F/4.5-5.6D VR

£940

Reasonably priced but a little dated

**T**he very first Nikon SLR lens to feature Vibration Reduction, this D-mount edition was originally launched in 2000. As such, it's a relatively old stabilisation system and only gives a two-stop benefit. There are two VR modes, both of which benefit from automatic panning detection. One applies stabilisation only during exposures, the other shows the effect full-time in the viewfinder but increases battery drain.

There's a focus limiter switch and a ring for switching between auto and manual focus. A major compromise is that the lens has no internal autofocus motor. Instead, it's driven via a helical thread from motors built into Nikon full-frame SLRs and upmarket DX format bodies like the D7100, D300s and D90. The upshot is that autofocus is impossible on cameras like the D3300 and D5300.

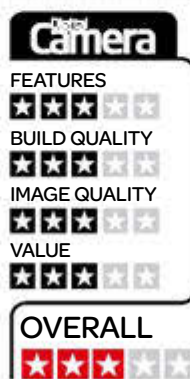
Build quality is good overall but it lacks weather seals. Plus points include the fitment of three ED (Extra-low Dispersion) elements and a well-rounded nine-blade diaphragm.

### PERFORMANCE

The large front element is moved forwards and backwards during focusing adjustments. Coupled with the fact that it's driven by an in-camera motor, autofocus is painfully slow, especially in comparison to the ring-type ultrasonic systems used in most competing lenses. Image quality is good at short-to-mid-zoom settings, but sharpness drops off towards the long end of the zoom range.



**Tech focus...**  
17 elements in 11 groups, 9 diaphragm blades, closest focus distance 230cm, 77mm filter thread, autofocus drive from camera, physical dimensions 91x171mm, weight 1,340g



## NIKON AF-S 80-400MM F/4.5-5.6G ED VR

£2,000

Twice the price – but twice as good

**S**ome 13 years newer than Nikon's 80-400mm D-mount lens, this G-mount edition was launched last year and is bang up to date. The antiquated aperture ring has gone, and other areas are massively improved.

Its ring-type ultrasonic autofocus is not only fast and near-silent, but also enables full autofocus compatibility on all Nikon digital SLRs. It's bigger and heavier than the older lens, but the build feels more robust. It's also the only lens here to feature weather seals. There are four rather than three ED elements inside, plus an additional Super ED element.

The new-generation Vibration Reduction system gives as much as a four-stop bonus, making it more effective than the older lens's VR. It still features auto panning detection but adds normal and active modes. The latter is great if you're shooting wildlife on safari, from an idling or even moving vehicle. Trick autofocus modes include A/M and M/A, with priority being given to AF or manual focusing respectively, and there's also a fully manual option. Other extras include a zoom lock switch and a focus limiter.

### PERFORMANCE

Along with excellent autofocus speed and accuracy, stabilisation performance is superb. This helps to deliver consistently sharp handheld shots even in tricky conditions, throughout the entire zoom range. Overall image quality is a sizeable step up from the older lens.



**Tech focus...**  
20 elements in 12 groups, 9 diaphragm blades, closest focus distance 150cm, 77mm filter thread, ring-type ultrasonic autofocus, physical dimensions 96x203mm, weight 1,570g







## ° PANASONIC 100-300MM F/4-5.6 LUMIX G VARIO £420

A small but powerful MFT lens

**B**udget 70-300mm telephoto zooms tend to be reasonably compact, even though most are designed for full-frame cameras. This Micro Four Thirds optic only needs to deliver a relatively small image circle, enabling the design to be even smaller and lighter in weight. Meanwhile, the 2.0x crop factor of the Four Thirds system gives it an effective telephoto reach of 600mm.

Coupled with a similarly downsized body like the Panasonic GX7, you get the luxury of heading off into the wilds with the minimum impact on your carrying load. The combined weight of the GX7 and this lens is just 922g.

Build quality doesn't feel as rugged as in the more upmarket lenses on test, but this is reflected in the price. There's still plenty to impress, however, including the fitment of an ED (Extra-low Dispersion) element and a Mega OIS optical image stabiliser, which delivered a three-stop advantage in our tests.

### PERFORMANCE

Contrast-detection autofocus systems and stepping motor actuators are both notorious for lacking speed. However, coupled with the GX7, AF performance proved reasonably quick in our tests. It's not as fast as the ring-type ultrasonic systems in most other lenses on test, but massively quicker than the D-mount edition of the Nikon 80-400mm.

Image quality is good overall but, as is often the case, sharpness drops away at the long end of the zoom range.



**Tech focus...**  
17 elements in 12 groups, 7 diaphragm blades, closest focus distance 150cm, 67mm filter thread, stepping motor autofocus, physical dimensions 74x126mm, weight 520g

Digital Camera

FEATURES

★★★★★

BUILD QUALITY

★★★★★

IMAGE QUALITY

★★★★★

VALUE

★★★★★

OVERALL

★★★★★



## SIGMA 50-500MM F/4.5-6.3 DG OS HSM £1,000

A worthy update to the first 'Bigma'

**N**icknamed the 'Bigma', the chunky Sigma 50-500mm made its first appearance in 2005. This revamped edition was launched five years later, with a redesigned optical path and the addition of an image stabiliser. The new lens features four SLD (Special Low Dispersion) elements.

The stabiliser is fitted not only to the Canon and Nikon variants, but also to Pentax and Sony models. This gives users of the latter two camera body makes the option of in-camera, sensor-shift stabilisation or in-lens optical stabilisation (except in the Pentax \*ist or the K100D). In-lens stabilisation usually works best for telephoto shooting, as well as enabling the effect to be seen through the viewfinder.

The extra-large zoom range can be a bonus in wildlife shooting, if you need to quickly zoom out to more standard focal lengths without the time to swap lenses. It also reduces the need to change lenses in outdoor environments. Ring-type ultrasonic autofocus is fast and effective, but there's no focus limiter switch. At just under 2kg, it's the heaviest lens here — a side-effect of this is that it suffers from zoom creep, but at least there's a zoom lock switch.

### PERFORMANCE

Sharpness is quite good, but the huge 10x zoom range brings higher than average distortion, switching from barrel distortion at 50mm to pincushion at mid-to-long zoom lengths. Overall, the new version is an improvement over the original, and good value at the price.



**Tech focus...**  
22 elements in 16 groups, 9 diaphragm blades, closest focus distance 50-180cm, 95mm filter thread, ring-type ultrasonic autofocus, physical dimensions 104x219mm, weight 1,970g

Digital Camera

FEATURES

★★★★★

BUILD QUALITY

★★★★★

IMAGE QUALITY

★★★★★

VALUE

★★★★★

OVERALL

★★★★★



## SIGMA 150-500MM F/5-6.3 DG OS HSM

£730

Big telephoto reach at a budget price

**C**oming to the market in 2008, roughly halfway between the two editions of the Sigma 50-500mm lens, this one sacrifices overall zoom range but retains the same 500mm maximum telephoto reach. It's a little longer and narrower than its 50-500mm sibling, and about 200g lighter in weight. Similarities include the same layout of switches for AE/M focus, dual-mode stabiliser for static and panning shots, and zoom lock. There's also the same lack of a focus limiter switch.

Both Sigma lenses have finger grooves in the tripod foot, which some photographers find comfortable to use in handheld shooting. Again, optical stabilisation can be used on the same range of Pentax and Sony cameras, as well as in the Canon and Nikon editions. SLD (Special Low Dispersion) elements are included, but this time there are only three rather than four. At the front, the filter thread is 86mm compared with 95mm on the 50-500mm lens.

### PERFORMANCE

This lens delivers more sharpness in the 150-400mm section of the zoom range. However, sharpness drops off slightly more at 500mm. Distortions are less noticeable, with modest pincushion rising gradually from 150mm to 500mm settings. Colour fringing is also reduced, making this cheaper Sigma a great buy. It's always been a favourite in terms of value for money, but is likely to face competition from the new Tamron 150-600mm lens.



**Tech focus...**  
21 elements in 15 groups, 9 diaphragm blades, closest focus distance 220cm, 86mm filter thread, ring-type ultrasonic autofocus, physical dimensions 95x252mm, weight 1,780g



## SONY 70-400MM F/4-5.6 G SSM II

£1,800

Improved with faster autofocus

**T**his updated version of the original Sony 70-400mm was launched last year. The white finish remains, and improvements in most respects aren't easy to spot. Optical stabilisation certainly hasn't been added – no big surprise given that Sony favours sensor-shift stabilisation in its SLR and SLT cameras.

The SSM (Super Sonic wave Motor) autofocus has been redesigned and upgraded; Sony claims a four-fold increase in speed. There's also the addition of Nano AR (Anti-Reflective) coatings on all optical surfaces, helping to keep ghosting and flare to a minimum. Overall build quality remains sturdy.

The lens boasts three focus lock buttons around the mid section of its barrel. These fall naturally under the fingers, whichever orientation you're shooting in. A focus limiter switch is also fitted, enabling you to lock out the short end of the range between 1.5-3m.

Handling is refined, with a silky smooth action to the zoom and focus rings, and no hint of zoom creep. Given the fairly steep price of the lens, however, weather seals would have been a useful addition.

### PERFORMANCE

Autofocus speed is a marked improvement over the original lens, but it's not noticeably quicker than in other lenses that also feature ring-type ultrasonic systems. Image quality is sharp throughout the zoom range, with good levels of contrast even at the widest available apertures.



**Tech focus...**  
18 elements in 12 groups, 9 diaphragm blades, closest focus distance 150cm, 77mm filter thread, ring-type ultrasonic autofocus, physical dimensions 95x196mm, weight 1,500g





# IMAGE QUALITY IN FOCUS

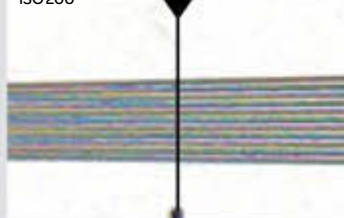
	CANON EF 100-400MM F/4.5-5.6L IS USM	CANON EF 400MM F/5.6L USM	NIKON AF 80-400MM F/4.5-5.6D VR	NIKON AF-S 80-400MM F/4.5-5.6G ED VR
SHARPNESS TEST	<p>ISO 200</p> <p>One of the highest-scoring lenses on test for sharpness, the Canon retains good performance at the long end of the zoom range.</p>	<p>ISO 200</p> <p>It's better than most zoom lenses in the group at their 400mm focal length settings, but no sharper than the Canon 100-400mm.</p>	<p>ISO 200</p> <p>Good at the short to medium section of the zoom range. Sharpness drops off more than in most competing lenses at the long end.</p>	<p>ISO 200</p> <p>This retained excellent sharpness at all focal lengths during real-world tests with various bodies, but lab scores on our D7100 disappointed.</p>
FRINGING TEST	<p>Colour fringing can be noticeable, especially towards the edges and corners of the frame. It's controlled best at mid zoom settings.</p>	<p>Fairly well controlled. There's significantly less colour fringing than with the Canon 100-400mm lens at its equivalent zoom setting.</p>	<p>Outright levels of fringing are lower than in the Canon 100-400mm lens, but follow the same path as you progress through the zoom range.</p>	<p>The new Nikon does well to keep colour fringing to an absolute minimum. It's a real star performer in this respect.</p>
DISTORTION TEST	<p>Barrel distortion is negligible at 100mm, while pincushion is slightly above average between 200mm and 400mm focal lengths.</p>	<p>It's a super-telephoto prime lens so distortion is fairly low, but there's not a massive reduction compared with some competing zoom lenses.</p>	<p>This lens has particularly noticeable barrel and pincushion distortions at either end of the zoom range, which are among the worst in the group.</p>	<p>Barrel distortion is minimal at 80mm and, while pincushion can be a little noticeable at long focal lengths, it's certainly not excessive.</p>
	<p><b>IMAGE TEST VERDICT</b> It's an old lens, but still has a lot of image quality to offer. Sharpness is impressive, but the performance for fringing could be better.</p> <p>★★★★☆</p>	<p><b>IMAGE TEST VERDICT</b> Image quality is of a high standard, but consistently sharp handheld shots are difficult to achieve without the aid of image stabilisation.</p> <p>★★★★☆</p>	<p><b>IMAGE TEST VERDICT</b> Sharpness at 400mm can be disappointing and distortions are on the high side. It's a poor relation of Nikon's newer 80-400mm lens.</p> <p>★★★★☆</p>	<p><b>IMAGE TEST VERDICT</b> High-quality glass and modern design help to ensure very good image quality, which is further assisted by an effective optical stabiliser.</p> <p>★★★★★</p>

PANASONIC 100-300MM  
F/4-5.6 LUMIX G VARIO



ISO 200

24



Good, but not great, sharpness from the Panasonic follows a fairly typical path of dropping off as you extend through the zoom range.



As sharpness decreases at longer focal lengths, colour fringing also becomes worse, making the lens weakest at its longest zoom setting.



Unusually, pincushion distortion is actually worst at the shortest end of the zoom range, although it's rather better at longer settings.

### IMAGE TEST VERDICT

Sharpness and fringing are least impressive at the long end of the zoom range, but overall image quality is good for a fairly inexpensive lens.

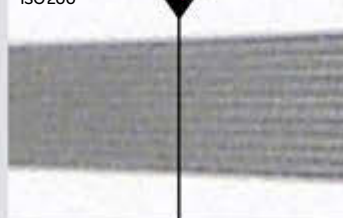


SIGMA 50-500MM  
F/4.5-6.3 DG OS HSM



ISO 200

16



It's not quite as sharp as most competing lenses at the short end of the zoom range, and sharpness drops off quickly at longer lengths.



A little disappointing at mid-to-long zoom settings but, in the latter case, colour fringing is better restrained than in the Canon 100-400mm.



Considering the massive 10x zoom range for this type of lens, barrel and pincushion distortions at either end are fairly well controlled.

### IMAGE TEST VERDICT

Bigger zoom ranges usually come at the expense of a drop in image quality, but the Sigma 50-500mm holds its own pretty well.

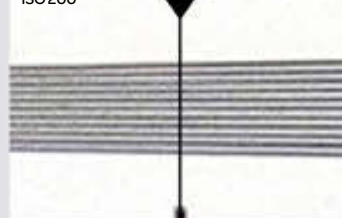


SIGMA 150-500MM  
F/5-6.3 DG OS HSM



ISO 200

24



Sharpness is better than from the Sigma 50-500mm at focal lengths of between 150mm and 400mm, but drops off at the long end.



The Sigma doesn't give much colour fringing at either end of the zoom range, and there's almost none at mid zoom settings.



Pincushion distortion is already slightly apparent at the 150mm zoom settings, but doesn't get too much worse at longer focal lengths.

### IMAGE TEST VERDICT

Despite being reasonably priced, this Sigma delivers impressive image quality, although sharpness at 500mm could be better.

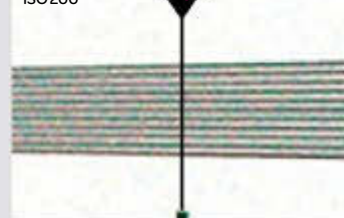


SONY 70-400MM  
F/4-5.6 G SSM II



ISO 200

28



Sharpness is best at the short end of the zoom range, but drops off towards the long end. Contrast is good, even at wide apertures.



Colour fringing is best controlled in the middle of the zoom range. At the long end, it beats the Canon 100-400mm and Sigma 50-500mm.



Distortions range from very slight barrel at 70mm to a little pincushion at medium-to-long zoom settings.

### IMAGE TEST VERDICT

Image quality is good, with most scores being mid-pack for performance. The Sony still justifies its high asking price thanks to its refined handling.





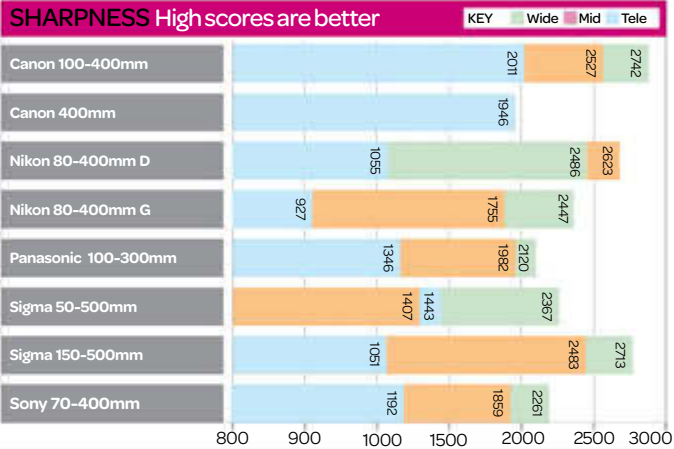
WHAT'S THIS? Find out how we test on page 6

LENS BENCHMARKS

How each lens performed in our tests

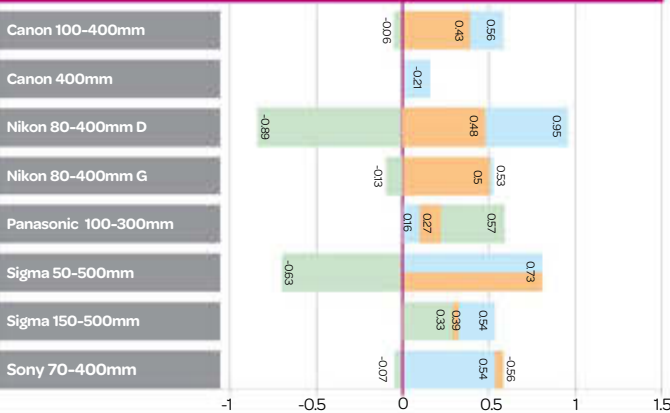
Most super-telephoto zoom lenses in the group deliver their greatest sharpness at the short end of the zoom range – the only exception is the D-mount edition of the Nikon 80–400mm, which peaks at mid-zoom focal lengths. As shown in our graphs, sharpness from some lenses drops off quite a bit at medium zoom settings, while others retain sharpness better, only becoming softer at their longest focal length.

Another common thread is that colour fringing is often worst at both ends of the zoom range, performance in this respect being best at mid-zoom settings. The exceptions are the Panasonic 100–300mm and Sigma 50–500mm, which control fringing best at the short end and give a gradual increase throughout the zoom range. There's often very little barrel distortion at each lens's shortest focal length, switching to fairly low pincushion distortion at medium and long zoom settings.



In all cases, you can see that the levels of sharpness drop off to some extent as you near the longest end of the zoom range.

DISTORTION Closer to 0 is better



In every case, super-telephoto zooms in this group show most colour fringing at their longest available focal lengths.

FRINGING Low scores are better

	Wide	Mid	Tele
Canon 100–400mm	1.48	0.71	2.52
Canon 400mm	N/A	N/A	0.78
Nikon 80–400mm D	0.71	0.37	1.23
Nikon 80–400mm G	0.25	0.13	0.62
Panasonic 100–300mm	0.25	0.54	1.13
Sigma 50–500mm	0.68	1.16	2.04
Sigma 150–500mm	0.39	0.09	1.01
Sony 70–400mm	1.16	0.77	1.39

Distortions are generally well controlled, even in the D-mount edition of the Nikon 80–400mm, which gives the worst scores in the group.

HOW THE LENSES COMPARE

	Canon EF 100–400mm f/4.5–5.6L IS USM	Canon EF 400mm f/5.6L USM	Nikon AF 80–400mm f/4.5–5.6D VR	Nikon AF-S 80–400mm f/4.5–5.6G ED VR	Panasonic Lumix G Vario 100–300mm f/4–5.6	Sigma 50–500mm f/4.5–6.3 DG OS HSM	Sigma 150–500mm f/5–6.3 DG OS HSM	Sony 70–400mm f/4–5.6 G SSM II
Contact	www.canon.co.uk	www.canon.co.uk	www.nikon.co.uk	www.nikon.co.uk	panasonic.com/uk	sigma-imaging-uk.com	sigma-imaging-uk.com	www.sony.co.uk
Street price	£1,280	£1,130	£940	£2,000	£420	£1,000	£730	£1,800
Mount options	C	C	N	N	X	C N P S Sg	C N P S Sg	S
Image stabiliser	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Autofocus type	Ultrasonic (ring)	Ultrasonic (ring)	None (from camera)	Ultrasonic (ring)	Stepping motor	Ultrasonic (ring)	Ultrasonic (ring)	Ultrasonic (ring)
Min focus distance	180cm	350cm	230cm	150cm	150cm	50–180cm	220cm	150cm
Filter size	77mm	77mm	77mm	77mm	67mm	95mm	86mm	77mm
Included accessories	Hood, pouch	Hood (built-in)	Hood, pouch	Hood, pouch	Hood, pouch	Hood, pouch	Hood, pouch	Hood, pouch
Dimensions (DxL)	92x189mm	90x257mm	91x171mm	96x203mm	74x126mm	104x219mm	95x252mm	95x196mm
Weight	1,380g	1,250g	1,340g	1,570g	520g	1,970g	1,780g	1,490g
FEATURES	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
BUILD QUALITY	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
IMAGE QUALITY	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
VALUE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OVERALL	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

## THE DIGITAL CAMERA VERDICT

## NIKON AF-S 80-400MM F/4.5-5.6G ED VR

One of the newest lenses in the group, the Nikon takes top honours

**P**roof that the march of technological progress can be a great thing, the new G-mount edition of the Nikon 80-400mm VR is massively better than the older D-mount lens. It's beautifully built and is the only lens in the group to feature weather seals, so your wildlife shooting isn't hampered if it starts raining. It's also a bonus for dry, dusty conditions, out on safari.

Its autofocus is very fast, its optical stabilisation is the most effective of any lens

in the group, and image quality is simply excellent. It's also the most expensive lens on test here, and twice as pricey as the older Nikon 80-400mm lens, but in this particular case you really do get what you pay for.

Despite being of a similar age to Nikon's older lens, the Canon 100-400mm IS has held up better over time. Autofocus is nice and quick, and image quality is very good, although stabilisation isn't as effective as in other stabilised lenses in this test group.

Overall though, it's a more appealing buy than Canon's 400mm prime lens. The Sony 70-400mm is another impressive lens, with premium build, handling and image quality.

Both Sigma lenses also have a lot to offer, but of the two, we prefer the 150-500mm OS, which is unbeatable value for money. For Micro Four Thirds, the Panasonic 100-300mm Mega OIS lens is a smart buy and, typical of MFT lenses, it's endearingly compact and lightweight.



NIKON AF-S 80-400MM F/4.5-5.6G ED VR **£2,000**

**What's good:** Sophisticated features; great image quality and stabilisation; weather-sealed

**What's bad:** It's the most expensive lens here, costing twice as much as the older D-mount

**Our verdict:** Premium performance and handling make it well worth the high price



## Digital Camera

# OUR TEST RESULTS

The very best wildlife lenses revealed and rated



SONY 70-400MM F/4-5.6 G SSM II **£1,800**

**What's good:** Fast autofocus; upgraded Nano AR coatings; AF lock buttons

**What's bad:** Relies on in-camera sensor-shift stabilisation, often giving mediocre performance

**Our verdict:** Quality build and upmarket handling justify the price tag for Sony users



CANON EF 100-400MM F/4.5-5.6L IS USM **£1,280**

**What's good:** Good sharpness throughout; image stabilisation; quick autofocus

**What's bad:** Old-generation stabiliser has become outclassed; odd trombone-style zoom mechanism

**Our verdict:** It still performs well, making it the top choice for Canon shooters



SIGMA 150-500MM F/5-6.3 DG OS HSM **£730**

**What's good:** Generous 500mm reach; effective optical stabiliser; fast autofocus

**What's bad:** Sharpness could be better at 500mm; no focus limiter switch; affected by slight zoom creep

**Our verdict:** It's not the sharpest tool in the box, but it's unbeatable value at the price



PANASONIC 100-300MM F/4-5.6 LUMIX G VARIO **£420**

**What's good:** Micro Four Thirds format enables it to be very compact and lightweight

**What's bad:** Image quality drops off at the longer end of the zoom range; at longer focal lengths colour fringing also becomes worse

**Our verdict:** It's the best choice for long reach on any MFT system camera





# Image editors

Which is the best tool to help you make your photos fulfil their potential? *Rod Lawton* finds out if there's life beyond Photoshop

## THE ENTRY LIST

**1 Adobe Photoshop CC 2014 £8.78 / \$9.99 per month\***  
[www.adobe.com](http://www.adobe.com)

Most would contend that Photoshop is the best image editor bar none, but it's now one of the best bargains too, thanks to its subscription plan.

**2 Adobe Photoshop Elements 13 £81 / \$100** [www.adobe.com](http://www.adobe.com)

Adobe's amateur-orientated image editor has a few new effects and a redesigned interface, but does it do enough to stay ahead of the rest?

**3 Adobe Photoshop Lightroom 5 £8.78 / \$9.99 per month\***  
**or £103 / \$149 for permanent licence** [www.adobe.com](http://www.adobe.com)

With Apple's Aperture on its way out, Lightroom is now the top pro image cataloging application, and Adobe's subs offer makes it even more tempting.

**4 Corel PaintShop Pro X7 £60 / \$80** [www.corel.com](http://www.corel.com)

PaintShop Pro is one of the imaging industry's old-timers, so this latest version has some work to do to keep up with its rivals.

**5 CyberLink PhotoDirector 6 £80 / \$100** [www.cyberlink.com](http://www.cyberlink.com)

This amateur-orientated Lightroom challenger adds some interesting editing tools that its Adobe rival doesn't have, although that may not be enough.

**6 DxO OpticsPro 10 £119 / \$199** [www.dxo.com](http://www.dxo.com)

DxO's instant and automatic lens corrections can transform the results from your camera, and its raw conversions are among the best too.

**7 Phase One Capture One Pro 8 £182 / \$285**  
[www.phaseoone.com](http://www.phaseoone.com)

Phase One's professional image-capture and raw conversion program is only half a step behind Lightroom, and produces beautiful results.

**8 Serif PhotoPlus X7 £80 / \$125** [www.serif.com](http://www.serif.com)

PhotoPlus promises the power of Photoshop at a fraction of the price, but can it compete now that the real thing is so affordable?

\*via Adobe Creative Cloud Photography Plan subscription



# GROUP TEST

IMAGE EDITORS

141



Cameras

Lenses and Accessories



Photoshop has long been regarded as the yardstick for all other image editors – but the market has changed. Photographers don't

just need image-manipulation tools: they also need programs that can organise, search through and share an ever-growing library of photos. And as more of us shoot raw-format files, the quality of the raw conversion process and the tools you can bring to bear on it become more important.

So although Photoshop might still be the best image editor, an image editor in itself may no longer be enough for the things we want to do with our photos today. That's why we've rounded up eight different image-editing tools to cover all these different jobs, from regular image editors to image-cataloguing specialists like Lightroom and all-out raw converters like DxO OpticsPro.

TAG-TEAM EDITING

What's becoming increasingly obvious is that one program alone may not be enough. You may find you need to use two, or maybe even three, to get all the features you need. For example, Photoshop is brilliant at image-editing, but offers no tools at all for organising, searching and collating your photos. You can use its bundled companion program Adobe Bridge, but that's really just a file browsing tool, and relies on you maintaining a rigid folder-based filing system. The larger your image collections become, and the more you

“What’s becoming increasingly obvious is that one program alone may not be enough”

want to find, use and share your photos in different ways, the more difficult it becomes to use folders alone.

That's why many photographers use Lightroom alongside Photoshop. Lightroom tackles the complex image management jobs that Photoshop is not designed for and makes light work of day-to-day enhancements and raw files, while Photoshop takes care of the advanced image-editing tasks that Lightroom can't do. It's no accident that Adobe is bundling both together in its current subscription-based Photography Plan. They complement each other perfectly and, in many ways, they belong together.

Photoshop Elements is a more complete package, coming with its own Organizer app to look after your photo collection. But it is designed for casual snappers and enthusiasts in a way that's very obvious, and sometimes a little irritating. It has limitations for more advanced work, and while once it cost a fraction of the price you paid for Photoshop, the gap is now effectively very narrow if you stay up to date with each release.

LIGHTROOM RIVALS

Lightroom does not have the image cataloguing and raw conversion

How we test software

Six of these programs come in both Mac and Windows versions. These were tested on a dual-core Mac with 8GB RAM running OS X 10.10 Yosemite. Two, Corel PaintShop Pro X7 and Serif PagePlus X7, are Windows-only. These were tested on a dual-core PC with 4GB RAM running Windows 7. Given the performance difference between the two machines, allowances were made for operational speed.

The eight applications were evaluated using a range of criteria:

The range of tools: not just editing options, but image management.

- Raw conversion quality – an increasingly important factor for today's photographers.
- Ease of use and interface design.
- The range of effects, and the quality of results.
- Suitability for users of different skill levels.

The brief was principally to bring together all the leading commercial image-editing programs on the market to see how well they catered for the evolving needs of digital photographers. We use reviewers with long-standing software experience, both with the products being tested and their previous versions.

market to itself. Cyberlink PhotoDirector 6 offers many of the same tools with a more amateur-orientated twist, while Capture One Pro 8 is bearing down on Lightroom from the professional end of the market, with its own cataloguing tools and a highly competitive set of raw image adjustments.

It's interesting to compare the results from these different raw conversion tools. Adobe Camera Raw, as used by Photoshop and Lightroom, is by far the best-known and most widely used raw converter, but that doesn't mean it's the best. DxO OpticsPro takes raw conversion quality to the extreme, using lab-developed camera and lens profiles and constantly developing technology to deliver results you may not have realised your camera is capable of.

THE OLD VERSUS THE NEW

Digital imaging is going through some exciting times. So where does this leave old favourites like Corel PaintShop Pro and Serif PhotoPlus? Both have proved popular with PC owners looking for lower-cost solutions, but times are changing. Which companies are ahead of the curve, and which are trading on past glories? And can any of them topple the mighty Adobe from its perch?

Non-destructive editing

Traditional image-editing processes permanently modify the pixels in the image. Once you've made changes, there's no way back. This means you need to save a new version of your photo so that the original is still available, and while programs like Photoshop offer some degree of undoing, even after the file has been saved, editing is usually an irreversible process.

The increased use of raw files, however, poses a challenge to this convention, because they cannot be edited directly. The solution is to use non-destructive editing tools, which change the appearance of the raw file being edited but are only applied permanently when a new, processed JPEG or TIFF file is exported. The advantages of this approach are:



Above Software with non-destructive editing tools give you the ultimate in photo processing flexibility.

- All adjustments can be reworked and wound back at any time – even years later.
- The original file is unaltered – and this can apply to regular JPEGs, not just raw files.
- It saves disk space because edited versions are 'virtual' until you export new files.

## Get to know... Adobe Photoshop CC 2014

One of the best-known user interfaces in the world



### TOOLS PANEL

Many of the tools have fly-out panels for choosing different tool variations.

### WORKSPACE

The Photography workspace hides 3D, drawing and design tools you don't need.

### PANELS

The panels can pop open when you need them, then close again when you're finished.



## Software spotlight

### Layers and masks

Many image-editors offer layers, but Photoshop brings a special blend of power and simplicity, thanks to Smart Objects with undo-able filters, fast and effective masking tools and the integration of blend modes and adjustment layers.

The other key point about Adobe's Creative Cloud subscription is its community aspect. It also works alongside free Adobe iOS apps such as Photoshop Mix, for mobile image-editing, Photoshop Sketch, Adobe Color and Adobe Shape.

## PERFORMANCE

There are simpler, cheaper alternatives to Photoshop CC, but no other program can match its depth, power and sophistication. Yet Adobe has managed to condense all this power into a clean, straightforward and efficient interface.

Photoshop excels at effects, montages, layers and selections. Although it's largely a traditional 'destructive' editor, it can do non-destructive editing too, thanks to Adobe Camera Raw, Adjustment Layers and Smart Objects, which let you rework plug-in filter settings.

Photoshop doesn't offer a whole lot of help to beginners – but by Adobe's way of thinking, that's what Photoshop Elements is for. Neither does Photoshop offer much by way of creative guidance. It'll let you do practically anything you want – if you know what you want in the first place.

\*Photography Plan, with Lightroom

# Adobe Photoshop CC 2014

## £8.78 / \$9.99 per month\*

WINDOWS/MAC Is it worth paying for monthly?



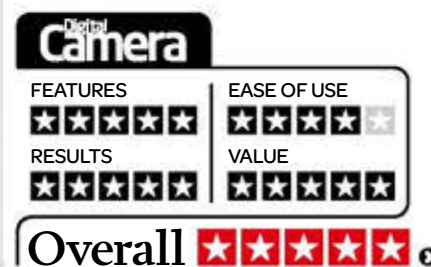
**A**dobe caused controversy when it swapped over to a subscription-only plan for Photoshop purchases, but Adobe has since cut the fee right down to under £9 per month – and that includes a subscription to Lightroom 5.

This means you can get both programs for less than £100 each year, with automatic updates. The most recent major update was in June 2014, when Adobe replaced the original Photoshop CC with a new Photoshop CC 2014 version.

The update has brought with it a performance boost, thanks to improvements to Adobe's Mercury graphics engine, and intelligent

“Photoshop will let you do practically anything you want – if you know what you want”

upsampling for better results when enlarging images. The new version also has some advanced Spin and Path blur effects; a Focus Mask tool for isolating sharp areas of images; an advanced Perspective Warp tool that can straighten two sides of a building at once; and an improved version of the Content-Aware Fill tool, now with colour blending.



From the makers of Digital Camera magazine



**Get to know... Adobe Photoshop Elements 13**

An interface that can evolve as your editing skills improve



**TOOLS PANEL**

Elements has many of the tools in Photoshop, but in a novice-friendly interface.

**EDIT MODES**

Expert mode gives most control; Guided and Quick are mainly for editing novices.

**TOOL OPTIONS**

When you select a tool, its options are displayed in this area below the image.



**Software spotlight**  
*Guided edits*

The Guided mode in Elements is a great introduction to more advanced techniques. Each process follows a step-by-step sequence, where each step is accompanied by a short explanation of what's involved and how that particular tool or process works.

Elements 13 introduces an eLive panel that links to online resources and tutorials. Otherwise, the additions since version 12 are small: you can now use Photomerge Compose to blend objects from different images more convincingly; it's possible to nudge selections precisely into position; and the Crop tool suggests four different ways for you to compose your image.

**PERFORMANCE**

Back when Photoshop cost hundreds of pounds to buy, it was easy to accept that Elements offered a cut-down toolset. Now it's not. You don't get Curves adjustments (the Adjust Color Curves panel is not really a proper substitute); you can't work in CMYK or Lab colour modes; and you don't get Path or Pen tools for more complex editable selections.

Perhaps the biggest loss to photographers, however, is inside Adobe Camera Raw. The version that comes with Photoshop has 10 panels and is practically an image-editor in its own right. The version that comes with Elements has just three panels, catering for only the most basic raw-format adjustments.

**Digital Camera**

<b>FEATURES</b> ★★★★★	<b>EASE OF USE</b> ★★★★★
<b>RESULTS</b> ★★★★★	<b>VALUE</b> ★★★★★
<b>Overall</b> ★★★★★	

# Adobe Photoshop Elements 13

£81 / \$100

WINDOWS/MAC It's Photoshop for editing novices

**P**hotoshop Elements has long been popular with photographers looking for a cheaper and easier alternative to Photoshop, but Adobe's swap to a subscription plan for Photoshop means the price differential is almost gone – you can get Photoshop CC and Lightroom 5 for a year for just £20 more.

But Elements is still the easier option for image-editing novices. The Organizer app can sort, organise and search your whole photo library, and it connects directly with the Editor application, which has three modes: Quick, Guided and Expert.

Quick mode offers basic, push-button enhancements, but Guided

**“The Crop tool suggests four different ways for you to compose your image”**

mode is more interesting because you can try out effects and learn how they're done at the same time.

Expert mode is where you get to take full manual control, and it offers a good proportion of the tools in Photoshop itself – although the tool options panel design takes up a little too much space at the bottom of the screen.

## Get to know... Adobe Photoshop Lightroom 5

Devoted to helping you get the most out of your photos



### ATTRIBUTES

You can add ratings, colour labels and flags to images, and filter them later.

### PANELS

The image enhancement option and effects are displayed in these stacked panels.

### TOOLS

You can crop images, add gradient and radial filters and even clone out objects.



## Software spotlight

### Lightroom library

Lightroom's editing tools are only half the story – its real power lies in its image-cataloguing tools. Each image can be assigned different attributes, such as a star rating, colour label or flag, and you can add keywords, captions, copyright information and more, then filter your images.

Adobe Camera Raw, its editing options are limited. You can apply localised adjustments with a brush, graduated and radial filters, and you can remove spots or unwanted objects with the Spot Removal tool. There's also automatic lens correction (for supported lenses) and an excellent Upright tool for fixing converging verticals and other perspective issues.

What you can't do is create layered images, make complex corrections or create sophisticated multi-step effects. For that, you'll still need Photoshop. The good news is that if you subscribe to Adobe's Photography Plan, you get both.

You can still get Lightroom 5 as a regular purchase with a permanent licence, but it costs more than a one-year subscription to Photoshop CC and Lightroom together.

A subscription will also enable you to get the most from your mobile device – there's a free Lightroom Mobile app for iOS or Android, which offers basic editing and organising tools and synchronises with the desktop version.

\*Photography Plan, with Photoshop CC. Permanent licence, £103 / \$149.

# Adobe Photoshop Lightroom 5

## £8.78 / \$9.99 per month\*

WINDOWS/MAC Image cataloguing and editing in one



**P**hotoshop is a terrific image editor, but its companion Bridge is not designed for managing large photo collections. Lightroom is. It's based around a powerful image management database, and can make light work of organising, filtering and searching big image collections.

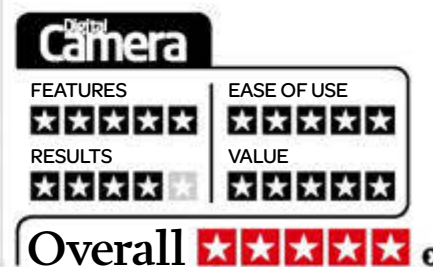
The editing tools are the same as those in Photoshop's Camera Raw plug-in, reconfigured into a single window. Modules address each stage of your photographic workflow: importing and organising your photos, enhancing them, then sharing and printing them via Slideshow, Book, Print and Web modules. You can even log where they were taken.

**"It can make light work of organising, filtering and searching big image collections"**

Lightroom's editing adjustments are non-destructive. You can revisit and rework them any time you like. If you want to use these edited images in any other applications, you can export them as JPEGs or TIFFs.

### PERFORMANCE

Lightroom's cataloguing tools are terrific, but because it's based around







Get to know... **Corel PaintShop Pro X7**

A program that's become increasingly novice-friendly



**INSTANT EFFECTS**

The Effects panel offers a good choice, and you can hide it to save space.

**LEARNING CENTRE**

PaintShop Pro's Learning Centre helps you discover image-editing techniques as you go.

**LAYERS**

These work in much the same way as the layers in Photoshop and Elements.

# Corel PaintShop Pro X7

£60 / \$80

WINDOWS One of Photoshop's oldest rivals

**P**aintShop Pro has become simpler and more novice-friendly over the years. It now presents an integrated workflow with three tabs: Manage, Adjust and Edit.

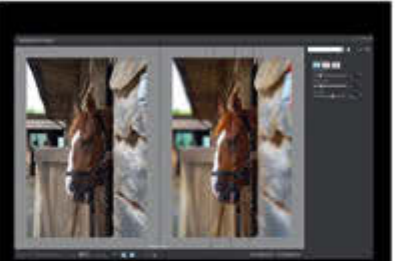
The Manage tab takes care of your photo organisation. You can browse folders directly without having to import them, but you can also create virtual and smart collections. On the whole, it's simple and straightforward to understand.

The Adjust panel is for routine image enhancements, and offers a good selection of effects. These adjustments are not non-destructive, though – PaintShop Pro might look like Lightroom and PhotoDirector, but

“PaintShop Pro might look like Lightroom, but in fact it's a traditional editor”

in fact it's a traditional editor that edits your images directly, saving new versions of your files when it's done.

The Edit panel offers more advanced and manual controls, such as the levels, curves and colour adjustments you'd use in Photoshop. PaintShop Pro is also compatible, Corel says, with Photoshop plug-ins, so you can add extra tools.



## Software spotlight Special effects

PaintShop Pro X7 comes with eight special effects, each of which gets its own dedicated tools. This is the Selective Focus effect: it's like the tilt-shift tools in other image-editors and plug-ins.

The new X7 version brings a Magic Fill tool (the equivalent of Adobe's Content-Aware Fill), 30% faster brushes, and text- and shape-cutting tools. This underlines that fact that PaintShop Pro is not just for image-editing – it's an all-round painting, drawing and illustration tool.

## PERFORMANCE

The editing tools are comprehensive, but they're also a little clunky. The adjustment dialog boxes offer small before and after previews, which seems terribly old-fashioned. There is a checkbox to display the results of your adjustments live, but the screen updates are not quick.

Worst of all, it falls down on one of the most basic operations for an image editor today: opening and converting raw files. It has a Camera Raw Lab, which opens automatically if you select a raw image for the Edit mode. Oddly, this can be bypassed if you simply use the Adjust mode, with rather poor results.

Not that the Camera Raw Lab's results are much better. The tools are limited and the quality of the conversions is poor. You'll have to work pretty hard to equal the quality of your camera's JPEGs, let alone improve on them.

**Digital Camera**

<b>FEATURES</b>	<b>EASE OF USE</b>
★★★★★	★★★★★
<b>RESULTS</b>	<b>VALUE</b>
★★★★★	★★★★★
<b>Overall</b> ★★★★★	

## Get to know... Cyberlink PhotoDirector 6 Ultra

Discover photo editing at its purest



### TOOLS

All the tools in the Adjust module are non-destructive – you can use preset effects too.

### MODULES

Like Lightroom, PhotoDirector organises your tools into modules to avoid clutter.

### ADJUSTMENTS

This is PhotoDirector's graduated filter in action – it's just like Lightroom's.



## Software spotlight

### Edit module

PhotoDirector's Adjustment module offers non-destructive editing tools, just like Lightroom, but its Edit module acts like a regular image editor. But while these Edit tools add to PhotoDirector's versatility, they don't go far enough to replace a regular image editor.

sequences, create panoramas and make people look more beautiful with Beautifier tools and a Body Shaper.

The downside is that these tools are quite amateur-orientated. They certainly don't cover the whole range of photo projects and adjustments people might want to try – and, unlike Lightroom, PhotoDirector doesn't let you seamlessly transfer images to a second image editor.

## PERFORMANCE

It's in the Adjustment panel that you get to carry out the same non-destructive enhancements as Lightroom, and it's where the similarities are most obvious, right down to the Adjustment Brush, Gradient Mask, Radial Mask and Spot Removal tools.

It's all very smooth and slick, but you can never escape the feeling that you're working with a cut-price Lightroom clone – except that the price isn't cut by much. You get extra tools in the Edit panel, but there's no equivalent of Lightroom's Upright automatic perspective correction tool, its Quick Develop tools, or its Smart Previews for editing images stored on disconnected devices.

Digital Camera	
FEATURES	EASE OF USE
★★★★★	★★★★★
RESULTS	VALUE
★★★★★	★★★★★
Overall ★★★★★	

From the makers of Digital Camera magazine

# Cyberlink PhotoDirector 6 Ultra

## £80 / \$100

WINDOWS/MAC This Lightroom look-alike undercuts it

**T**he resemblance of PhotoDirector to Lightroom is quite striking. It has the same broad workflow, with different modules running across the top. These include a Library, Adjustment, Edit, Slideshow and Print panels. It doesn't have Lightroom's Map, Book, Slideshow and Web panels, but these are probably not on top of most photographers' must-have lists.

So why does PhotoDirector have both an Adjustment and an Edit tab? That's because they respectively offer non-destructive and destructive adjustments for your use.

Lightroom's editing tools are non-destructive. But there are things a

**"The Edit tools don't cover the whole range of projects people might want to try"**

non-destructive tool like this can't do, like layers and masks; for those, Lightroom passes you over to the traditional tools of Photoshop.

PhotoDirector, however, offers many of these conventional adjustments without the need for an second program. In the Edit panel you can remove objects or backgrounds, combine images, blend HDR exposure



**Get to know... DxO OpticsPro 10 Elite**  
Software to help your digital photos sparkle



**CUSTOMIZE**  
The Customize tab is where you make detailed adjustments to your photos.

**VIEWPOINT**  
You'll now need the ViewPoint plug-in to apply perspective corrections to photos.

**PRIME**  
The powerful Prime noise reduction process is now faster than before.

# DxO OpticsPro 10 Elite

£159 / \$199

WINDOWS/MAC The most specialised program on test

**D**xO OpticsPro detects the different degrees of distortion, chromatic aberration, edge softness and vignetting common to practically all digital camera lenses, then compensates for them. It checks the EXIF shooting data embedded in the image by the camera, then looks up the combination of camera body and lens in its test database.

It's also a raw converter, and DxO has applied just as much scientific rigour to this process as to its lens corrections. (Fujifilm owners take note, though – OpticsPro does not currently support X-Trans sensors.) You can apply a range of presets – you get to see how your image will look

**“The difference in detail and noise control compared with Camera Raw is obvious”**

before you choose – or adjust the settings manually.

At this point, OpticsPro can get quite technical, especially when you're juggling the Exposure Compensation, Smart Lighting and Selective Tone settings to get the best tonal balance and dynamic range. It's worth it, though, because DxO OpticsPro's raw conversions are quite superb. The



## Software spotlight

**ViewPoint and FilmPack**

DxO makes two other programs – ViewPoint 2.5 and FilmPack, both £59 – which can now integrate with OpticsPro as plug-ins. You'll now need ViewPoint to apply geometric corrections. FilmPack 5, meanwhile, is designed to reproduce old films and darkroom processes.

difference in detail rendition and noise control compared with Adobe Camera Raw is immediately obvious.

## PERFORMANCE

OpticsPro now integrates directly with DxO's ViewPoint 2.5 and FilmPack 5 programs. ViewPoint offers advanced perspective corrections, while FilmPack replicates the look of classic films, darkroom processes and cheap cameras.

DxO has also made its Prime de-noising process faster. The standard noise reduction is impressive, but Prime can work the most amazing transformations on high ISO images, although it's slow.

A new ClearView option applies localised contrast enhancement to improve distant landscape scenes, and, according to DxO, the program is 1.5 times faster to launch and 10 times faster at loading files.

The results from OpticsPro are excellent. However, it lacks any image cataloguing tools and localised adjustments, so it could never be your one and only image-editing tool.

Both Essential and Elite editions handle all cameras, but you need Elite for the more advanced tools.

**Digital Camera**

<b>FEATURES</b> ★★★★★	<b>EASE OF USE</b> ★★★★★
<b>RESULTS</b> ★★★★★	<b>VALUE</b> ★★★★★
<b>Overall</b> ★★★★★	

## Get to know... Phase One Capture One Pro 8

From a niche tool to a genuine Lightroom contender



### TOOLS AND TABS

The tools and tabs can be rearranged to suit your preferred working methods.

### VIEWER

This shows the image you're working on, which is selected in the Browser.

### VARIANTS

You can work on existing images or create a Variant so you can experiment with your edits.



## Software spotlight

### Variants

Capture One Pro can and create Variants, which apply different treatments to one photo without changing the original. Variants can be processed and exported in just the same way as real photos. This takes up a lot less space than creating real copies of files in a program like Photoshop.

Details (sharpening, noise reduction, grain) and batch-processing options.

You can rearrange these tabs to suit your workflow, hide the ones you don't want and re-arrange your favourites into a single Q (quick) tab.

## PERFORMANCE

Capture One Pro is expensive compared to its rivals, so you'd expect the results to be good. In fact, they are more than just good. Capture One Pro can extract exceptional detail from raw files – the difference compared to JPEGs, or even Adobe Camera Raw conversions, can be striking.

It also produces strong, powerful colours and contrast, and extremely good separation of shadow tones. The result is a terrific impression of sharpness, clarity and definition.

But Capture One Pro has a flaw. It does not support external editors or plug-ins, so you can't send an image to Photoshop or Google's Nik Collection plug-ins, for example, and have the edited version returned automatically to the Capture One Catalog. If Phase One were to add this, then Capture One Pro would have five-star potential.

Digital Camera	
FEATURES	EASE OF USE
★★★★★	★★★★★
RESULTS	VALUE
★★★★★	★★★☆☆
Overall ★★★★★	

From the makers of Digital Camera magazine

# Phase One Capture One Pro 8

## £182 / \$285

WINDOWS/MAC Software that's as good as its cameras?

**C**apture One began as a professional tethered shooting studio application, but has steadily migrated towards mainstream use. With the addition of full cataloguing tools in version 7, Capture One became a direct rival to Lightroom, offering raw conversions for a wide range of cameras, powerful non-destructive image adjustments, style presets, automatic lens corrections and local adjustments made with adjustment layers and masks – an easier approach to grasp than Lightroom's, and powerful too.

Version 8 brings an updated processing engine, a modernised interface (the slider knobs are bigger,

"The result is a terrific impression of sharpness, clarity and definition"

but nothing else leaps out), improved HDR tools, better noise and moiré reduction, a speed boost and sundry other improvements.

The basic workflow is the same, though. You import images into the Catalog, then use a series of tool tabs to adjust Color, Exposure, Lens (corrections), Composition (cropping, straightening, keystone correction),



0

Get to know... **Serif PhotoPlus X7**  
A powerful image-editor that's easy to get into



**HOW TO**  
The How To panel offers intermediate users a handy guide to editing tasks.

**DOCUMENTS**  
This displays all the images currently open – handy when combining photos.

**LAYERS**  
PhotoPlus's layers work just like Photoshop's, and you get adjustment layers too.

# Serif PhotoPlus X7

## £80 / \$125

WINDOWS Photoshop power at a budget price

**P**hotoPlus's similarity to Photoshop is obvious, right down to the screen layout, with a tools palette on the left, tool options on the top toolbar and stacked palettes including adjustments and layers on the right. But then the two programs diverge. PhotoPlus X7 has beginners in mind, and features an array of Studios for creating different photo effects.

There's a general-purpose PhotoFix Studio, for example, plus Makeover Studio, Black and White Studio, Warp Studio, Cutout Studio and Print Studio.

This latest version adds support for Lab mode (useful for certain kinds of colour adjustment), lens

**"PhotoPlus X7 has beginners in mind, and features an array of Studios for effects"**

corrections and a Clarity filter, which boosts local contrast for added definition. The Clone tool from earlier releases is improved, with an advanced live preview; the PhotoFix Studio has a Smart Brush tool for applying adjustments to specific areas; and there are three new blend modes for layers: Vivid Light, Hard Mix and Pin Light.



**Software spotlight**  
**Photoshop on the cheap**  
On paper, PhotoPlus X7 does practically everything that Photoshop does. If you're patient and stick at it, you'll be able to achieve some decent results. Mac owners will soon be able to get a Serif image editor: the company is working on Affinity Photos to line up alongside its Affinity Designer program.

### PERFORMANCE

These features are worth having, but they don't address PhotoPlus's principal failings. One problem is that it's confusing – why have a PhotoFix window, for example, that carries out what look like similar adjustments to the main editor window? Another is the poor quality of some of the tools. The slow and ponderous Cutout Studio, for example, had trouble cutting out a dark grey set against a near-white sky – a simple subject.

Worst of all, though, is the Raw Studio. This supports most cameras (there's a list on the Serif website), but the quality between models varies massively. The results from a Nikon D7100 seemed OK, but those from a Nikon D5200 looked dark and muddy. As if that wasn't enough, if you try to open a raw file that PhotoPlus X7 doesn't support, it doesn't tell you so – it just creates a really bad conversion with distorted colours and muddy tonal rendition.

In itself, PhotoPlus X7 is patchy but reasonable – but the low quality of its raw conversions is a major drawback for anyone using it to work on their own photos.

Digital Camera

FEATURES	EASE OF USE
★★★★★	★★★★★
RESULTS	VALUE
★★★★★	★★★★★

Overall ★★★★★

## THE DIGITAL CAMERA VERDICT

## ADOBE STAYS ON TOP

The combo of Photoshop, Lightroom and a low-cost sub is unbeatable

One thing has become clear. If you want the best image cataloguing tool, the best raw converter and the best image-editor, you're not going to find them in one program – but you might in one package. Available for a single subscription fee, the Photoshop CC and Lightroom 5 combination comes closest to a single do-it-all solution, especially since they work so well together.

But that's not quite the whole story. More photographers are shooting in raw to get the best possible quality. Here, DxO OpticsPro 10 and Capture One Pro 8 deliver the best images.



## THE RESULTS Our top three image editors in a nutshell

## DXO OPTICSPRO 10

**What's good:** Excellent lens and perspective corrections; superb raw conversions and noise reduction.

**What's bad:** Too specialised to be your only software, with no cataloguing tools and no localised adjustments.

**We say:** You thought Adobe Camera Raw did a good job with raw files? DxO OpticsPro will open your eyes.

## PHASE ONE CAPTURE ONE PRO 8

**What's good:** Exceptional fine detail; rich and saturated raw conversions; local adjustments; cataloguing.

**What's bad:** No support for external editors or plug-ins – its one weakness compared to Lightroom.

**We say:** If you're more interested in ultimate quality than do-it-all versatility, this is a serious contender.

HOW THE  
IMAGE  
EDITORS  
COMPARE

Product name	Adobe Photoshop CC 2014	Adobe Photoshop Elements 13	Adobe Photoshop Lightroom 5	Corel PaintShop Pro Ultimate X7	Cyberlink PhotoDirector 6	DxO OpticsPro 10 Elite	Phase One Capture One Pro 8	Serif PhotoPlus X7
Price	£8.78 / \$9.99 a month*	£81 / \$100	£8.78 / \$9.99 a month*; or £103 / \$149	£60 / \$80	£80 / \$100	£159 / \$199	£182 / \$285	£80 / \$125
Website	www.adobe.com	www.adobe.com	www.adobe.com	www.corel.com	cyberlink.com	www.dxo.com	phaseone.com	www.serif.com
Platform	Windows / Mac	Windows / Mac	Windows / Mac	Windows	Windows / Mac	Windows / Mac	Windows / Mac	Windows
Raw support	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Y
Browsing	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Y
Catalogue	No	Yes	Yes	Yes	Yes	No	Yes	Y
Virtual copies	No	No	Yes	No	Yes	Yes	Yes	N
Lens correction	Automatic	No	Automatic	Manual	Automatic	Automatic	Automatic	Manual
Layers	Yes	Yes	No	Yes	Yes	No	Limited	Y
Plug-ins	Yes	Yes	Yes	Yes	N	Yes	No	Y
FEATURES	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
EASE OF USE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
RESULTS	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
VALUE	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
OVERALL	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

\*Adobe Creative Cloud Photography Plan includes Photoshop CC and Lightroom



# Sturdy tripods

These beefy beasts are built to give rigid support to chunky SLRs and weighty lenses

## 1 Benro C2970F Versatile Transformer + BH2-M ball head

**Price:** £245 **Web:** [www.kenro.co.uk](http://www.kenro.co.uk)

This carbon-fibre tripod features an excellent pivoting centre column mechanism. It extends to 184cm, with load ratings of 12kg and 8kg for the legs and head respectively.

★★★★★

## 2 Gitzo GT3542XLS Series 3 6X Systematic + GH3780QD ball head

**Price:** £1,070 / \$1,530 **Web:** [www.gitzo.co.uk](http://www.gitzo.co.uk)

The Gitzo raises the stakes for rigidity, with well-crafted carbon fibre legs and a solid ball head, with load ratings of 25kg and 21kg respectively. Even without a centre column, the tripod has a maximum height of 212cm.

★★★★★

## 3 Induro AT214 Alloy 8M + BHD1 ball head

**Price:** £295 / \$309 **Web:** [www.indurogear.com](http://www.indurogear.com)

Like the Gitzo and Sirui tripods in this test, this aluminium Induro is based on four sections in each leg, rather than three. As such, it folds down to a modest 64cm (with head attached) and extends to a useful 180cm. The maximum load ratings are 10kg for the legs, and 12kg for the head.

★★★★★

## 4 Manfrotto MT055CXPRO3 + 498RC2 ball head

**Price:** £300 / \$360 **Web:** [www.manfrotto.co.uk](http://www.manfrotto.co.uk)

The load ratings of 9kg and 8kg for these legs and head are a little down on some competing outfits, but they feel sturdy and strong. Next-gen features include revamped clip locks for the leg sections and four-way multi-angle leg locks. The maximum operating height is tall at 183cm.

★★★★★

## 5 Sirui N-3204X + K-30X ball head

**Price:** £475 / \$605 **Web:** [www.sirui.co.uk](http://www.sirui.co.uk)

As favoured in many current travel tripods, this Sirui's legs swing up vertically to encompass the head, reducing stowage length to just 51cm. The operating height is a lofty 187cm, and the load ratings are 18kg and 30kg for the carbon-fibre legs and ball head respectively.

★★★★★

## 6 Slik Pro 700DX kit

**Price:** £130 / \$140 **Web:** [www.sliktripod.co.uk](http://www.sliktripod.co.uk)

This complete kit has a conventional three-way head, rather than a ball head. At 3.6kg, it's the heaviest combo in the group – but its load rating is only 6.8kg. In operation, the Slik is quite a rigid and sturdy performer, even at its full height of 191cm.

★★★★★



★★★★★  
Digital  
**Camera**  
BEST ON  
TEST

★★★★★  
Digital  
**Camera**  
GOLD  
AWARD

# ACCESSORIES

STURDY TRIPODS

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Cameras

Lenses and Accessories

From the makers of **Digital Camera** magazine





# Sensor cleaning kits

Cleaning your camera's sensor is easier than ever, but which kit is best for the job?

## 1 Delkin SensorScope DSLR Camera Cleaning System

**Price:** £80 / \$130

**Web:** [www.delkin.com](http://www.delkin.com)

This gadget-laden case packs a 4-LED SensorScope loupe with 5x magnification, so dust has nowhere to hide. But it's the range of cleaning options that impresses.

Rather than a boring blower, Delkin's SensorVac will suck dust clean away. It's USB-powered, so can run off your laptop or an included battery pack, and it features two fan speeds and an LED light. Any remaining rubbish can be removed with swabs and solution.

Finish up by giving your sensor a polish using the SensorPen – but take care that it doesn't leave streaks.

## 2 Dust Aid Platinum & Dust Wand Combo

**Price:** £48

**Web:** [www.cameraclean.co.uk](http://www.cameraclean.co.uk)

The tiny Dust Aid Platinum is a simple device consisting of a wand with a soft pad on the end, plus six adhesive silicone cleaning strips. Simply press the pad onto a freshly peeled strip and dab it onto your sensor to remove loose dirt. Providing you don't rock or twist the pad on the sensor, it doesn't leave any residue.

For stickier stains, there's the Dust Wand. It's another liquid-and-swab set-up, but you have to make your own swabs by wrapping a small cloth around a plastic handle.

You'll still need extra illumination to see your sensor clearly, but all in all this kit's hard to fault.

## 3 Green Clean Sensor Cleaning System

**Price:** £65

**Web:** [www.green-clean.at](http://www.green-clean.at)

Blowing compressed air at your sensor is a no-no, but Green Clean has added a vacuum attachment to safely suck dust and dirt out of your camera via a pipe and a plastic wand.

If any muck survives the suction, cleaning swabs will shift it. Unfortunately these come in the form of separate wet and dry versions, so the cleaning process takes longer than it does with a single swab and fast-evaporating solution, and can potentially leave streaks.

The Mini Vacuum wand also needs to be positioned unnervingly close to your sensor, such is the system's asthmatic suction.

### Digital Camera

**What's good:** Includes everything you could need for a spick and span sensor.

**What's bad:** SensorVac doesn't move dust as well as a good blower.

**We say:** A good all-rounder, but we found it capable of leaving a few streaks.

**VERDICT** ★★★★★

### Digital Camera

**What's good:** Compact, cost-effective and removes all types of dirt.

**What's bad:** Requires extra gear to help you see what you're doing.

**We say:** A great value cleaning kit that cleans superbly.

**VERDICT** ★★★★★

### Digital Camera

**What's good:** Sucks small, loose particles from your camera.

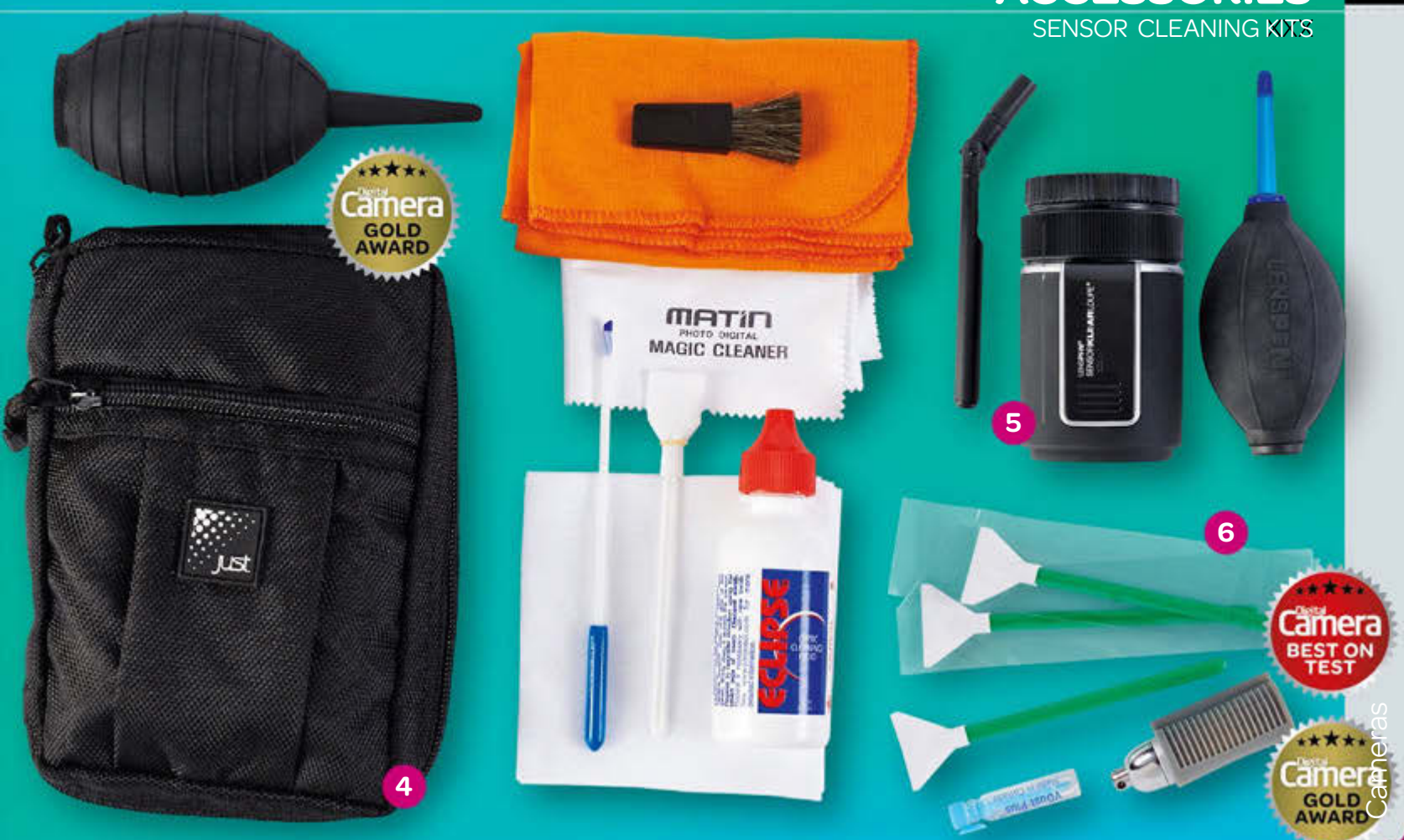
**What's bad:** No magnification or illumination. Not particularly powerful.

**We say:** Looks good on paper, but falls short on performance and value.

**VERDICT** ★★★☆☆

# ACCESSORIES

## SENSOR CLEANING KITS



### 4 Just Pro Cleaning Kit

**Price:** £79

**Web:** [www.cameraclean.co.uk](http://www.cameraclean.co.uk)

This comprehensive kit doesn't just help clean your sensor; it'll take care of your camera and lenses too, courtesy of 25 cleaning wipes, a pair of microfibre cloths and an anti-static brush.

When it comes to sensor cleaning, the Kinetronics Speckgrabber wand with its sticky tip will easily lift stuck-on particles without leaving a mark, or you can use the powerful jumbo blower to move loose dust. For a more serious clean, there are ten sensor swabs and a large bottle of fast-drying cleaning fluid.

The kit can be specced with three different swab sizes, depending on whether you own a full frame, APS-C or APS-H camera.

#### Digital Camera

**What's good:** Plenty of tools that'll give your whole camera a spring clean.

**What's bad:** Doesn't include a light or magnification device.

**We say:** Delivers a thorough clean, but a light would make the job easier.

**VERDICT** ★★★★★

### 5 LensPen SensorKlear Loupe Kit

**Price:** £40 / \$60

**Web:** [www.lenspen.com](http://www.lenspen.com)

You'll have no trouble seeing where to clean thanks to the SensorKlear Loupe with its LED illumination. Its focus is adjustable to cover sensor sizes from Micro Four Thirds up to full-frame, and it rests securely on the lens mount. There's also an opening on the side to let you clean with the loupe in place.

Cleaning performance is good, but not out of this world. The 'Hurricane' Blower generates more of a light breeze, however it still shifts loose particles. More stubborn specks can be uplifted using the SensorKlear II pen, although this isn't as effective as a swab/solution combo.

#### Digital Camera

**What's good:** The decent loupe gives a perfect view for cleaning.

**What's bad:** Blower and cleaning pen aren't quite up to the same standard.

**We say:** Cleans moderate muck well. A good kit for the cash.

**VERDICT** ★★★★★

### 6 Visible Dust EZ SwabLight Kit

**Price:** £38 / \$40

**Web:** [www.visible-dust.com](http://www.visible-dust.com)

Where the LensPen loupe has an opening to allow cleaning, Visible Dust has gone one better and lets you attach its SwabLight LED torch to the cleaning swab itself. The result is wherever you clean, the light always follows. Plus, as a bonus, the grippy SwabLight casing is much easier to hold on to than a spindly swab handle.

The kit also contains Visible Dust's Sensor Clean liquid, but only four Ultra MXD-100 swabs. That may not be an issue for occasional cleaning, but at £35 / \$44 for another dozen, extras don't come cheap. At least they do a decent job of cleaning, though, dislodging all dirt with a streak-free finish.

#### Digital Camera

**What's good:** Cleans well and includes a nifty sensor illumination gadget.

**What's bad:** No loupe magnification or blower; only comes with four swabs.

**We say:** A compact kit that removes stubborn grime with ease.

**VERDICT** ★★★★★

From the makers of **Digital Camera** magazine





# Flashgun modifiers

Don't settle for any old lighting: to see what your flashgun can really do, fit it with a light modifier

**1** **Graslon Insight Dome 4300D**  
**Price:** £59.95 / \$69.95  
**Web:** [www.graslon.com](http://www.graslon.com)

Bigger tends to be better when it comes to flash diffusers. However, the Insight Dome promises big performance from fairly compact 15 x 10 x 8cm dimensions.

Sliding mounting points ensure compatibility with pretty much any flashgun, and when you've got a snug fit, a Velcro strap locks everything in place and enables a rapid release.

But the magic happens inside, where a clever array of baffles and mirrors transform harsh light into much softer and more flattering illumination. We found that the flash compensation needs a boost to counteract the significant light loss.

**Digital Camera**

**What's good:** Good light softening and compatible with most flashguns.

**What's bad:** The fixed plastic design is lacking in compactness.

**We say:** This is a top performer, but it falls short on portability.

**VERDICT** ★★★★★

**2** **Interfit Strobies 30° Honeycomb Grid**  
**Price:** £20.99 / \$22.99  
**Web:** [www.interfitphotographic.com](http://www.interfitphotographic.com)

Flashgun modifiers don't have to merely soften light, so why not try something more stylised? This honeycomb grid narrows the flash beam down to 30°, helping to isolate your subject in a more dramatic light. Be prepared to up your exposure compensation a couple of stops for a balanced exposure, but you'll be rewarded with portrait shots packing plenty of visual impact.

Compact, lightweight construction keeps things portable. If you fancy getting more creative, the Strobies system includes a whole range of other modifiers to get the most out of your flashgun.

**Digital Camera**

**What's good:** A small and simple way to focus your flashgun.

**What's bad:** Extra outlay for a mounting bracket is required.

**We say:** This is a convenient gadget for spicing up portrait shots.

**VERDICT** ★★★★★

**3** **Lastolite Micro Apollo MKII**  
**Price:** £32.99  
**Web:** [www.lastolite.com](http://www.lastolite.com)

The Micro Apollo closely resembles a conventional softbox – but this design will stay upright without you messing about with supporting rods. Just pull the two plastic tabs on either side of the grippy, elasticated flashgun collar and hey presto, instant softbox.

It packs flat and weighs little, so you'll barely notice it on the go. The 20 x 13cm front diffuser panel balances performance and portability.

Considering it's a small and simple piece of kit, this modifier generates amazing results. Shadows are noticeably more diffused when compared to the conventional diffusers on test. Light temperature is impressively neutral.

**Digital Camera**

**What's good:** Superb, neutral light softening: it slips into a tight spot.

**What's bad:** It could be more rigid when it's set up.

**We say:** You won't find a better blend of performance, portability and price.

**VERDICT** ★★★★★



#### 4 Orbis Flash System

**Price:** £179 / \$239

**Web:** [enlightphotopro.com](http://enlightphotopro.com)

The ring flash is a firm favourite among fashion photographers wanting flattering illumination with minimal shadows. Dedicated ring flashes are pricey, but the Orbis creates the same effect from your flashgun, funnelling its flash-burst into a ring of light surrounding your camera lens.

Your flashgun needs to be hung below the camera using the chunky Orbis Arm bracket included in the pack, but you'll still need a remote trigger cable. The end result is a pretty unwieldy setup that'll certainly exercise your arms on long shoots, but the quality of light is worth the workout.

#### Digital Camera

**What's good:** Superb light softening and compatible with most flashguns.

**What's bad:** Big and bulky to use; needs a remote trigger system.

**We say:** No-compromise performance, but at the expense of convenience.

**VERDICT** ★★★★★

#### 5 Rogue Starter Lighting Kit

**Price:** £84.99 / \$99.95

**Web:** [www.expoimaging.com](http://www.expoimaging.com)

What's better than a single flashgun modifier? A whole collection of them! This kit includes a nifty FlashBender reflector that'll mould into almost any shape to direct your flashgun's beam. Try rolling it into a tube to create a snoot for concentrating light, or attach the included diffusion sheet to make a softbox. Mounting is straightforward thanks to a simple Velcro strap, and everything packs flat.

You also get a separate bounce card with a flag add-on that'll partially block light, plus 20 coloured gels. These attach in seconds using a rubber band and are great for tweaking light temperature or adding a splash of colour.

#### Digital Camera

**What's good:** Plenty of effective ways to transform ordinary flashgun lighting.

**What's bad:** The diffusion panel doesn't soften light particularly well.

**We say:** Indulge your creative side with this compact collection of modifiers.

**VERDICT** ★★★★★

#### 6 Viewfinder Photography Speedlite Diffusion Globe

**Price:** £19

**Web:** [www.viewfinderphotography.co.uk](http://www.viewfinderphotography.co.uk)

It may look like a cross between an exotic egg and a light bulb, but the bulbous shape of this diffusion globe is just the ticket for creating soft, even illumination. Direct it straight at a subject and shadows are considerably reduced, or angle your flashgun upward for an even softer look. The diffusion material produces a slightly warm colour cast which is nice for portraiture.

The Diffusion Globe is compact and light enough for handheld use, but the fixed shape isn't as travel-friendly as a collapsible design. The mounting system is more convenient, with two sizes to suit different flashgun heads.

#### Digital Camera

**What's good:** Softens light well and mounts to most flashguns.

**What's bad:** More compact designs offer comparable performance.

**We say:** Good for the money, but not particularly portable.

**VERDICT** ★★★★★





# Filter systems

Thought filters died with film? Think again, as a decent filter kit can still work wonders. We try out six of the best

**1 Cokin Snap! Starter Kit**  
**Price:** £24 / \$74  
**Web:** [www.cokin.co.uk](http://www.cokin.co.uk)

This cute little kit is ideal if you've got a compact system camera and fancy experimenting with filters. The kit can be supplied with adaptor rings between 37mm and 52mm, which suits most CSC lenses as well as some entry-level SLR kit optics. A three-slot holder enables some multi-filter creativity.

Two filters from Cokin's 140-strong A-Series range are included. A soft graduated warming filter helps create balanced sunset exposures, although you'd get more colour control using a graduated ND filter and tweaking tones in software. There's also a regular ND4 filter that's more versatile, letting you blur moving subjects.

## Digital Camera

- What's good:** Great ND performance and plenty of scope to expand.
- What's bad:** The small size limits compatibility to CSC and basic SLR lenses
- We say:** A good value, space-saving starter kit with room to grow.

**VERDICT** ★★★★★

**2 Cokin Landscape Kit 1**  
**Price:** £49.99 / \$66.47  
**Web:** [www.cokin.co.uk](http://www.cokin.co.uk)

So you've composed a stunning landscape shot, only to find it ends up looking bland or washed out. That's where this kit comes in handy. There's a blue-to-clear graduated filter that's ideal for restoring colour saturation to a bright sky, and a graduated warming filter to spice up a sunset. A conventional warming filter completes the trio and adds a retro vibe. All are 84mm-wide P-Series standard and will cover up to an 82mm lens.

Each filter works well and helps you get attractive shots. But you'll get more control with software, and a graduated ND filter is better for preventing blown-out skies.

## Digital Camera

- What's good:** A selection of quality filters at a reasonable price.
- What's bad:** Similar effects are achievable in software post-processing.
- We say:** Good for traditionalists, but now superseded by software.

**VERDICT** ★★★★★

**3 Formatt Hitech 100mm Premier Landscape Filter Kit**  
**Price:** £399 / \$599  
**Web:** [www.formatt-hitech.com](http://www.formatt-hitech.com)

Photographer Colby Brown helped assemble this landscape filter kit. A soft graduated ND4 filter keeps bright skies in check, or if you're shooting a very low sunset, the ND4 reverse grad cuts out light across its centre. Both deliver great results; the 100mm circular polariser also performs flawlessly.

Finally there's the ProStop IRND 6 which reduces light transfer by six stops to create super-smooth sea and skylines. Our test example introduced an obvious blue colour shift. A replacement was far better, indicating an isolated issue with an otherwise excellent kit.

## Digital Camera

- What's good:** A good mix of professional quality filters for outdoor shooters.
- What's bad:** A serious investment; possible quality control issues.
- We say:** A carefully considered kit for creating stunning landscape shots.

**VERDICT** ★★★★★



#### 4 Lee Filters Neutral-Density Hard Grad Set

**Price:** £176.40 / \$260

**Web:** [www.leefilters.com](http://www.leefilters.com)

Lee Filters' hand-made filters have a reputation for quality, and this set is no exception. Only the darkest ND8 filter in this trio exhibited a trace of a colour cast when shooting a white card, with the ND4 and ND2 filters performing perfectly. All three are ideal for balancing high-contrast landscapes by blocking up to three stops of light. Thanks to their large 100-x-150mm size, you get plenty of composition control.

The filters themselves are pretty pricey, and you'll need to fork out an extra £54 / \$88 for Lee's Foundation Kit filter holder, plus around £19 / \$28 for a lens adaptor ring.

#### Digital Camera

**What's good:** First-class optical quality and big enough to suit most compositions.

**What's bad:** Expensive, especially if you're starting from scratch.

**We say:** This kit and its accessories aren't cheap, but the filters are hard to beat.

**VERDICT** ★★★★★

#### 5 Kood P-Type ND Filter Kit

**Price:** £43.99

**Web:** [www.premier-ink.co.uk](http://www.premier-ink.co.uk)

Neutral-density filters are great for increasing dynamic range or reducing shutter speeds. This kit has ND2 and ND4 densities in both full and soft graduated styles. Individually they only block up to two stops of light, but stack two together and the results are more dramatic.

Multiple kits are available to suit all standard lens sizes. You needn't worry about upgrade compatibility, as the 82mm filter size and holder match the popular P-Series dimensions.

We found the ND4 filters introduced a noticeable blue colour cast, but it's nothing software can't correct, and it doesn't stop the kit being exceptional value for money.

#### Digital Camera

**What's good:** A useful filter selection at a terrific price.

**What's bad:** The darker filters are prone to introducing colour casts.

**We say:** Unbeatable value if you're not expecting optical perfection.

**VERDICT** ★★★★★

#### 6 SRB P Size ND Soft Grad Starter Kit

**Price:** £24.95 / \$41.39

**Web:** [www.srb-photographic.co.uk](http://www.srb-photographic.co.uk)

Like Kood, SRB adopts the 82mm P-Size filter format for a good balance of portability and lens coverage. There's only a single filter to get you going, but it's a versatile ND4 soft grad. And with extra filters starting at £12.50 / \$20.77 a piece, expanding the kit needn't break the bank.

SRB throws in a three-filter holder, a cleaning cloth and a storage wallet for eight filters. All you have to do is choose an adaptor ring, with 49mm to 82mm thread sizes available.

Considering the budget price, the optical quality was fairly good, with only a slight blue colour cast at the darkest point.

#### Digital Camera

**What's good:** Good performance and versatility for the money.

**What's bad:** These aren't the most neutral filters in this test group.

**We say:** This is a sensible starter kit that's easily upgradeable.

**VERDICT** ★★★★★



# White-balance targets

Don't let your shots' colour casts give you the blues

**1** Color Confidence Total Balance  
Price: £20 / \$30  
Web: <http://shop.colourconfidence.com>  
Sometimes the old ways are the best. This pop-up grey target works a treat for setting correct exposure and white balance. Its 12-inch size is easy to shoot, but it'll instantly collapse to fit in a 6-inch case.  
★★★★★

**2** Lastolite XpoBalance  
Price: £36  
Web: [www.lastolite.co.uk](http://www.lastolite.co.uk)  
XpoBalance is a refinement of a regular collapsible target, and includes black and white targets for setting contrast levels. On the back are three more grey segments, for use when exposure bracketing.  
★★★★★

**3** Datacolor SpyderCheckr 24  
Price: £42 / \$49  
Web: <http://spyder.datacolor.com>  
This double-sided correction card is great for setting your white balance during a shoot, or in tandem with the accompanying software to tweak colour afterwards. It works well, but isn't the most portable solution.  
★★★★★

**4** JJC WB-F1  
Price: £14 / \$18  
Web: [www.jjc.cc](http://www.jjc.cc)  
Don't fancy asking your portrait-sitter to hold a grey card? Just cover any lens with this nifty gadget when creating a custom white balance and hey presto – instant and accurate calibration, whatever your lighting.  
★★★★★

**5** Seculine Vivicap  
Price: £8 / \$14  
Web: [www.kaiser-fototechnik.com](http://www.kaiser-fototechnik.com)  
The Vivicap white balance filter clips onto your lens just like a lens cap. Trouble is, that means you'll need one for each different thread diameter, and its white balance results aren't all that accurate.  
★★★★★

**6** X-Rite ColorChecker Passport  
Price: £69 / \$99  
Web: <http://xritephoto.com>  
The Passport may be pricey, but it's built to last and is compact enough to fit in a tight spot. Multiple colour swatches and a large grey target help ensure your colour balance is always bang-on.  
★★★★★





# Premium 32GB SD Cards

The latest SLRs pack a punch when it comes to speed, so it's worth matching them with a good, fast SD Card

## 1 Delkin SD 633x UHS-1

Price: £53 / \$60 Web: [www.delkin.com](http://www.delkin.com)

Delkin's card has good reading and writing times. The tests Delkin subjects its cards to are particularly rigorous. In addition to shock testing, it's tested against salt spray, ultraviolet light and other harsh elements. The card has built-in error correction.

★★★★★

## 4 Samsung SDHC Pro

Price: £40 / \$30 Web: [www.samsung.com](http://www.samsung.com)

Samsung Pro cards aren't the fastest on test, but the differences are marginal. As you'd hope from a premium product, the card is shock-, water-, magnet- and X-ray-proof. It's a great all-round performer, with the second fastest reading and writing times in the test.

★★★★★

## 2 Lexar Professional 600x 32GB SDHC UHS-1

Price: £29 / \$30 Web: [www.lexar.com](http://www.lexar.com)

Lexar is a leading name, so you'd expect the Professional 600x to be one of the leaders in this test. However, it proved a fraction of a second off the pace. The card is thoroughly tested, and Image Rescue software is included.

★★★★★

## 5 SanDisk Extreme Pro SDHC UHS-1

Price: £42 / \$48 Web: [www.sandisk.co.uk](http://www.sandisk.co.uk)

You can pay more for the SanDisk name, but protection against the elements, fast reading and writing times and free image-recovery software makes this a good investment. The card also has built-in error correction.

★★★★★

## 3 PNY Elite Performance

Price: £56 / \$23 Web: [www.pny.com](http://www.pny.com)

The PNY Elite Performance is just faster than the Lexar and a fraction slower than the Transcend. Buffer speed tests placed the card at the top of the group when used in-camera. Like the other cards, the PNY is resistant to shock, water, temperature and magnetism.

★★★★★

## 6 Transcend SDXC/SDHC UHS-1 U3

Price: £27 / \$45 Web: [www.transcendusa.com](http://www.transcendusa.com)

The Transcend card delivers good all-round performance for both reading and writing. The card features built-in error correction and has been tested to work in extreme temperatures. It also comes with RecoverRX photo software.

★★★★★



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